Distr.
GENERAL

UNCTAD/SDD/INS/1/Rev.1
8 June 1994

Original: ENGLISH

UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

AGRICULTURAL INSURANCE IN DEVELOPING COUNTRIES

Study by the UNCTAD secretariat

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PREFACE

(i) A study on Agricultural Insurance in Developing Countries, UNCTAD/SDD/INS/1, was prepared in response to resolution 33 (XIII) adopted by the Committee on Invisibles and Financing related to Trade at its thirteenth session (first part), held in Geneva from 5 to 9 February 1990. In that resolution the secretariat was requested, inter alia, "To prepare a study on the possibilities for increasing insurance awareness in developing countries and in particular for extending insurance cover to productive entities in the traditional sector, with particular reference to agricultural production, by devising appropriate insurance covers and taking into account the work done in other organizations."

(ii) The eighth session of the Conference, which met at Cartagena in February 1992, suspended the Committee on Invisibles and Financing related to Trade, and decided to establish four Standing Committees, one of which is, inter alia, to deal with insurance. The terms of reference of that Committee, the Standing Committee on Developing Services Sectors: Fostering Competitive Services Sectors in Developing Countries, were adopted by the Trade and Development Board at its thirty-eighth session (second part), and include the terms of reference for the Insurance Programme. Paragraph 4 of these terms of reference requires the Committee "to analyse prospects for developing and strengthening the insurance sector and enhancing the trade of developing countries in this sector." The terms of reference also stipulate that the Committee should focus on "policies aimed at ... the development of ... producer services related to primary and manufacturing sectors ...".

(iii) The study was considered by a Group of Experts on Agricultural Insurance in Developing Countries at a meeting convened by the Secretary-General of UNCTAD, in Geneva on 28-29 January 1993. The report of the Group of Experts has been published as UNCTAD/SDD/INS/4 on 2 February 1993.

(iv) Neither the Study, nor the Report of the Group of Experts could be considered at the First Session of the Standing Committee on Developing Services Sectors: Fostering Competitive Services Sectors in Developing Countries (Insurance) held in Geneva, 1-5 February 1993. However, the Provisional Agenda for the Second Session of the Standing Committee (Insurance) provides that the Study, revised to take account of the comments and suggestions received from various sources, including the Group of Experts, UNCTAD/SDD/INS/1/Rev.1, will be considered at that session (Item 5 (iii) of the Provisional Agenda).

Chapter I

INTRODUCTION

A. Agricultural insurance and development

1. Agriculture remains the dominant sector in a large number of developing economies. It accounts for a major share of the gross national product and is still the primary source of employment. Moreover, agricultural products are often an important export item. Productivity gains in agriculture are necessary for self-sustaining economic development in most developing countries. Tables 1 and 2 show the importance of agriculture in developing countries.

Table 1

Percentage share of agriculture in GDP, 1988

Least developed countries	40.2
Developing countries of Africa	20.8
Developing countries of Asia	17.8
Developing countries of America	9.2
Developed market-economy countries	2.3

Source: UNCTAD, Handbook of International Trade and Development Statistics, 1990 (TD/STAT.18), United Nations publication, Sales No. E/F.91.II.D.1. New York, 1991, pp. 445-447.

Table 2

Labour force employed in agriculture as a percentage of the total labour force, 1988

Developing countries of Africa	43.7
Developing countries of Asia	56.3
Developing countries of America	27.2
Developed market-economy countries	8.3

Source: *Ibid.*, p. 526.

2. Despite the importance of agriculture in the developing countries, the various initiatives taken for its development have often failed to deliver full benefits. Low levels of income, low capital-labour ratios, and the general precariousness of agricultural production still characterize this sector in many countries. There is often a dichotomy between the urban and rural sectors of the economy, not only in terms of technology but, more

importantly, in terms of access to services, for example, transportation, medical and educational facilities, and credit and insurance.

3. For an orderly growth of the agricultural, and, more broadly, the rural sector, it is necessary to establish a comprehensive package programme of support services. This was recognized at the Second United Nations Conference on the Least Developed Countries in Paris in 1990. 1/ Insurance is a part of this package.

4. Agriculture has always been a risky business. 2/ Unlike the industrial sector, it is subject to the vagaries of the weather. The variations in productivity induced by nature cannot be fully accommodated by farmers. It is true that since time immemorial farmers have devised measures to limit these risks: crop rotation and diversification, inter-cropping, use of low yield but hardy varieties, tillage systems, share tenancy, contractual inter-linking, development of non-farm sources of income such as handicrafts and handlooms, socio-cultural strategies which distribute risks within the extended family, and informal financial arrangements. However, while these measures continue to be helpful, the problem of residual risks remains. The farmers are in addition subject to the common risk of a catastrophe and the aggregate group risk has still to be confronted. This co-variability of risks reduces the efficacy of traditional measures. The modern insurance sector can play a major role here, and considerably strengthen the security of farmers.

5. The transition from traditional to modern systems is also reflected in the delivery of credit to the agricultural sector. Given a well-defined production cycle with little inter-temporal flexibility, the timely availability of credit is essential for the development of agriculture. As traditional forms of credit have proved inadequate for a variety of reasons, in some countries governments are extending directional credit to this sector within an overall national policy, often despite an unfavourable net asset position of the farmers. For example, banks are required to earmark a certain percentage of their total loans for this sector in Colombia, India, the Philippines, Thailand and Venezuela. The fact that this is still not a general position is pointed out by the South Commission in its report on The Challenge to the South, when it states that for "smallholders limited access to institutional credit has been a principal barrier to their adoption of new technologies. It has been estimated that in the mid-1980s only 5 per cent of farmers in Africa and 15-20 per cent in Asia and Latin America had access to formal credit. Credit in rural areas is in many countries still provided by money-lenders and traders, often at usurious interest rates. Such sources are hardly suitable for financing agricultural development. There is thus a clear need to expand the availability of credit at reasonable rates." 3/ Credit and capital remain scarce in many countries and supporting rural credit systems to the extent required may be difficult. Agricultural insurance can play a distinct role in securing credit. It would make the farmer a better credit risk, and would alleviate some of the problems concerning the collateral which the farmer would have to offer. 4/ If the crop fails, the bank would receive a payment from the insurance company. Insurance, in fact, is common when mortgages or loans for capital goods are made to individuals and corporate bodies and the practice could be extended to the agricultural sector as well. The farmer would thus have better access

to credit. A high default rate is witnessed in agricultural credit. There are several reasons for this, including possible deficiencies in lending. None the less, agricultural credit is expanding rapidly, and needs to be protected. 5/

6. Related to the issue of scarcity of capital is the problem of a large part of savings in rural areas being locked up in "sterile assets" such as jewelry, gold, etc. It is true that these assets are often held for psychological reasons and as a hedge against the instability of the political system, which has a fallout on the financial regime. Nevertheless, unforeseen expenses, losses, and economic downturns are a real possibility and these savings come to the rescue. Insurance is also an instrument of saving in as far as it is a certain and quantifiable payment for an anticipated future event. 6/ Insurance as a saving can thus facilitate the release of "sterile assets", which will speed up the monetization of the rural economy. This is clearly the case with life insurance.

7. Another area where insurance is of relevance is in improving agricultural technology. New technology usually requires additional borrowing and investment, and the farmer may be reluctant to enter into additional commmitments since he is not sure of the production results. He therefore tends to take sub-optimal decisions. With the security of insurance, the farmer might be more willing to take a chance with efficient technology as his risks are now shared.

8. In many countries the State provides aid or relief to the agricultural sector in the event of a natural catastrophe as a matter of public policy. In some countries this is done on an ad hoc basis while in others there are formal arrangements and even legislation for this purpose. Agricultural insurance is a more efficient instrument and an institutionalized mechanism for dealing with the problem. It helps to streamline the relief efforts and reduces the direct and indirect costs on the national economy: some funds would be available for the purpose; the payments could be earmarked for replacing affected assets; and a portion of the cost would have been paid by the farmer as premium. 7/ Furthermore, the insurance infrastructure provides a mechanism for a more accurate measurement of losses and disbursement of compensation.

9. The benefits of enhanced financial and economic stability in the rural sector cannot be over-emphasized. Insurance can help agriculture to develop through institutionalized channels and can assist in speeding up the commercialization of the rural economy.

B. Scope of agricultural insurance

10. Crop insurance is the most widely discussed aspect of agricultural insurance. This is not surprising in view of the fact that the growing of crops remains the dominant feature of agriculture. However, the scope of agricultural insurance is much wider. It is not restricted to field crops. Horticulture, plantations, forestry, viniculture, rearing of animals such as livestock, aviculture (including poultry), aquaculture, sericulture, and apiculture are all related to agricultural activities. In its generic sense agricultural insurance extends to the entire production process including

post-harvest storage, processing and transportation of produce to the final markets. The capital assets employed in the production processes, including dwellings, machinery, draught animals, equipment and tools, processing plants, etc. are thus also to be included. Furthermore, although a theoretical differentiation can be made between agricultural and rural insurance, many aspects of the two are common and similar, and both can be treated together. From this point of view, extension of insurance services to individuals, and to their enterprises, engaged in various economic activities in the rural areas goes along with agricultural insurance. For example, various handicrafts and household products are often an important source of income for rural households. All these are within the scope of insurance. The study thus relates to extending insurance services to the rural sector in general and agriculture in particular.

Table 3

Growth of gross direct premium as a percentage of GDP (A), and combined underwriting results (B) of selected developing countries

Gross premium to GDP	Part A			Part B	
Country Year	1970 a/	1980	1989	1970/1989 % increase	Combined ratio b/ 1986
Latin America					
Argentina	1.73	2.23	2.06	19.1	81.60
Brazil c/	0.71	0.91	1.01	42.0	69.70 c/
Mexico	0.88	0.84	1.26	43.0	90.20
Asia					
Indonesia	0.24	0.50	0.80	233.0	74.40
Malaysia	1.57	2.12	2.88	83.0	85.30
Singapore c/	1.99	2.66	3.03	52.0	78.50 c/
Thailand c/	0.65	0.89	1.59	144.0	87.90
Africa					
Côte d'Ivoire	-	1.76	1.52	-	39.50 d/
Kenya	-	1.98	1.98	-	55.00 d/
Nigeria	-	0.59	0.89	-	75.00 d/
Tunisia	1.05	1.38	1.45	38.0	87.00
Europe					
Turkey	0.38	0.34	0.61	60.0	51.80

Source: Part A: Swiss Reinsurance Company, SIGMA, Nos.5/82 and 2/91.
Part B: UNCTAD, "Statistical survey on insurance and reinsurance operations in developing countries 1984-1986" (TD/B/C.3/231), January 1990.

a/ Figures based on GNP.

b/ Combined ratio = loss ratio (incurred claims as a percentage of premium) plus acquisition and management expenses for non-life insurers.

c/ 1985.

d/ 1987.

11. The scope of insurance in the development of the rural sector can be more comprehensive. Wherever investments are made - and considerable investments are being made into agriculture in developing countries - there

is a role for insurance. For example, extensive scientific research has been carried out to improve the quality of seeds, and cultivation of hybrid varieties has been taken up on an organized basis as a part of efforts to increase crop yield. Insurance for seed crops can be considered. Another interesting cover negotiable in the international markets relates to risks deriving from the professional liability of seed merchants and seed growers, including financial loss arising from restricted growth or crop failure caused by the seed growers' and seed merchants' errors and omissions. 8/ Insurance has been devised in India for reimbursing the cost of boring wells in villages if the operation is unsuccessful.

12. In this connection it should be mentioned that price fluctuations and unremunerative prices are an important risk for the agricultural sector. However, commodity price stabilization relates to a market and not a production risk, and thus is outside the purview of the insurance industry. 9/ The price risk problem may require direct government intervention. 10/

C. Insurance environment

13. The growth of the insurance industry in developing countries, although varied, has been appreciable. Table 3, Part A, shows the growth of gross premiums as a percentage of GDP in selected countries, and Part B shows the combined ratio (loss ratio plus acquisition and management expenses for non-life insurers) in these countries. However, this growth has been largely confined to meeting the requirements of the domestic industrial and organized trade and commercial sectors.

14. There are understandable reasons why the operations of insurance companies in developing countries are concentrated in urban areas. In many instances, the insurance markets are in what may be described as their infancy, and have yet to fully acquire expertise and consolidate. Furthermore, trade practices are better developed in urban areas. It is also a fact that the industrial sector is relatively easier to service - a petrochemical plant would have similar features anywhere. Much more needs to be done by insurance companies even in the urban areas in improving services and this keeps them preoccupied. But the potential for growth of insurance business in the urban sector is linked to the overall growth of the economy and the level of development of the country. 11/ In some developing countries, particularly on the African continent, the share of the modern sector in the economy is stagnant or even declining. There is, however, considerable potential for the expansion of business in the rural sector. On the one hand, this is due to the low level of insurance services existing in that sector, and, on the other, to the substantial growth potential of the agricultural sector. Consequently, the rural sector offers new opportunities for the growth of the insurance industry.

15. In the context of the possibilities of liberalization in the services sector and a reduction of trade restrictions over the next few decades, the domestic companies may find that extending business in rural areas is particularly rewarding because of their comparative advantage of greater familiarity with the environment.

16. For insurance companies wishing to make an entry into rural areas, but without the necessary organization there, a first step would be to extend the existing simple products already being marketed in urban areas. For example, life insurance, personal accident insurance, insurance of dwellings, shops, and small sector processing plants, can be marketed in the first instance. Once a foothold has been gained and an adequate insurance infrastructure has been built up it would be easier to introduce new products more directly related to agriculture. 12/ This approach would provide a base on the strength of which schemes more directly related to the agricultural sector can be built up. Such a policy could be an important strategy for the development of rural and agricultural insurance in developing countries.

17. However, the products taken to the rural areas may have to be slightly modified to meet specific requirements and, more importantly, simplified. A clear and transparent policy will be of great assistance in winning customers. This has been the experience of widespread medical, life and other personal insurance programmes.

18. As the size of each individual risk would be relatively small, negotiating terms individually may not be worthwhile or practical. One way to deal with this problem is to aim at group covers or to promote wholesale insurance services. Group covers also lessen the severity of the problem of anti-selection.

19. Delivery and servicing costs for rural and agricultural insurance are usually high. But if a sizeable part of the premium is used to finance administration, the case for rural and agricultural insurance is weakened. In fact, it has been held that one of the important factors inhibiting the expansion of rural and agricultural insurance is the high cost of administration. 13/ It is, therefore, essential to evolve strategies that would minimize expenses. Apart from group covers mentioned above, a package approach to insurance design and administration is often useful in limiting expenses. 14/ At the same time, care has to be taken to avoid a mere grouping of covers in a manner that will make them long and complicated. The paying capacity of the farmers also has to be kept in view. Package policies that cover several risks of farmers in various combinations are common in the United Kingdom and the United States of America. Such package policies have also been devised in India, Zambia and Zimbabwe.

20. Establishing links with other agencies such as credit institutions, banks, cooperatives, trade associations and marketing boards would also help in reducing costs. Their organizational infrastructure could be utilized for combining or coordinating certain functions related to servicing the insurance provided. The practice of issuing a "Master Policy" to a nodal agency, which collects premiums, informs individual beneficiaries that their risk has been covered, and collects and processes claim papers, is well established in India in several lines of agricultural insurance. The system

of crop insurance in Mauritius is based on the cooperation and assistance received from sugar-processing plants and the Sugar Syndicate. In Zambia a bank or cooperative society seeking insurance on a group basis does a considerable amount of work for the insurance company.

21. Another strategy to control costs would be to concentrate efforts initially in selected areas, based on a potentiality study. This would give the insurance sector a chance to adapt to the rural scene, as well as to develop convincing examples. Once credibility has been built up and the organizational infrastructure is in place the operations can be extended.

22. There is a special synergy between the banking and insurance sectors. The two interact and cooperate in urban areas in respect of trade and commerce. In rural areas, the banks have a much better interface with the people as they are perceived as benefactors. Agreements may be negotiated with banks, particularly agricultural development banks, for protection through insurance of assets created by credit. This, in fact, has been done in many developing countries. Often the banks will consent to take care of some administrative work as well. In Pakistan and Zambia the services of the mobile credit officers of the banking institutions are utilized to monitor and survey agricultural risks. It may be necessary for the insurance company to modify its procedures slightly to fit in with the banking system on the assumption that institutions such as a responsible bank can be entrusted with certain routine functions.

23. Insurance provides security to the lending institution, and this should be reflected in either a lower interest rate or some corresponding concession in the terms of the credit. For a variety of reasons, insurance is far from universal for all agricultural activities, and is being sought by lenders, or provided by borrowers, in selected cases only. Fairness requires that credit backed by insurance should be treated differently from credit with no backing.

D. Constraints and limitations

24. It is evident that insurance is not a panacea for the problems of the rural sector. Insurance in itself cannot increase productivity or be a source of financing, although it can play a role in enhancing both. Other basic issues such as an effective network of extension services, supply of inputs, and storage and marketing facilities are important. Insurance cannot be a substitute for deficiencies in these areas.

25. There are understandable limitations that prevent rapid growth of insurance business in rural areas. A large number of insurers in developing countries are undercapitalized. Consequently, their capacity to assume risks is limited. Reinsurance for agricultural risks is not easily available. Furthermore, skilled personnel, at both the managerial and operational levels, are scarce. Entering into agricultural insurance increases the strain on the avalable manpower.

26. There are also many constraints inherent in the rural environment, and some special operational problems have to be surmounted. Spatial dispersion, the large number of potential customers and the small size of the holdings,

and the lack of adequate information make quick expansion difficult. Farmers need to be convinced of the benefits of insurance before they accept it. Problems of anti-selection and moral hazard, which are a normal feature of the insurance system, are especially severe and accentuated in the case of farmers.

27. The insurance industry in developing countries recognizes these problems. The Governments have a role to play by providing a legal framework for the expansion of agricultural insurance, and by encouraging and persuading the insurance sector, if necessary by fiscal and other concessions, to venture more deeply into this territory.

E. Risk management

28. Risk management is an important aspect of agricultural insurance, and must be taken up in any discussion on the subject. In recent times insurance has been seen as part of an overall risk management strategy. It is true that insurance deals with risks, but the story begins much earlier. As a first step, risks have to be identified, studied and quantified from a physical point of view. Efforts have then to be made to contain or control them. The next step is to decide from the financial point of view either to retain the risks in-house as self-insurance, or to transfer them to a professional body, i.e. a captive or independent insurance organization. Although from a short-term and narrow perspective, this approach may result in an apparent reduction in their business, insurance organizations have accepted and indeed advocate the adoption of risk management systems. This also applies to agricultural insurance. Thus, agricultural insurance could often be the springboard for investigations into how and why damages take place, their measurement and, most importantly, for the adoption of measures to moderate and reduce the loss-producing effects of risks. This will also be a step in protecting the ecology and thus be a part of the concept of sustainable growth. This is a derivative benefit which should not be overlooked.

29. The final step in the risk management system, a decision regarding transfer of risks either in their entirety or in part for a price to professional risk bearers (the insurance sector) will depend upon a number of considerations. First, the extent of the protection required has to be determined. In spite of deliberate and well-conceived measures to control or contain risks, an irreducible element remains, posing a constant threat. Furthermore, a catastrophe, which is often unexpected, may upset calculations. Secondly, the capacity to retain and absorb risks has to be established in the context of the entity's financial strength. Thirdly, it has to be considered whether the price to be paid for purchasing insurance could be better utilized to minimize the possibilities and the extent of losses.

30. In practice such a minute examination may not always be undertaken, but it is necessary for both the insurance organizations and the takers of insurance (or policy makers on their behalf) to be aware of the possibilities. Unfortunately, risk management as a tool of reducing and/or preventing losses is least known and used for agricultural production. 15/

31. Risk management like other management systems has a strict regime. However, in this study the term "risk management" is used primarily in the sense of efforts aimed at reducing or preventing losses.

F. Sectors in agriculture

32. As the characteristics of different agricultural units vary widely, it is not possible to adopt a common approach to insurance for all sections. For a discussion of the subject, it will be helpful to classify agriculture broadly into four different sectors, mainly on the basis of organizational patterns, and the extent of commercialization: (i) traditional or subsistence agriculture; (ii) semi-commercial and emerging agriculture; (iii) commercial agriculture; (iv) specialized production systems. 16/ The problems of insurance differ for each of these sectors. In developing insurance programmes, this factor has to be kept in view.

33. It should be pointed out that these sectors are not exclusive and, in fact, often overlap. An agricultural unit may share the characteristics of more than one sector. Further, agriculture in any given country may not necessarily conform to this classification; there may be only two or three of these sectors. It is also possible for an agricultural unit to fall into a different sector in different countries. Even within each sector diversity arises owing to variations in agricultural cycles, crop patterns, climatic conditions, land holding and institutional patterns. Nevertheless, a conceptual classification of agriculture into these four categories will be helpful in discussing agricultural insurance.

1. Traditional or subsistence agriculture

34. A large segment of agriculture in developing countries is conducted by what may be called subsistence, or tiller-farmer, or communal farmers. The salient features are that the production is mainly for subsistence, the size of the farm is small, and the extent of commercialization is minimal. The technology is primitive, productivity is low, and marketing of output after consumption is unremunerative. There are no uniform international criteria for identifying the farmers or peasants belonging to this sector - definitions differ from country to country. Nor is there any systematic compilation of the extent of such farming. But it is common knowledge that a significant part of those engaged in agriculture in the developing world belong to this category. Their interests cannot be ignored, either politically or from the human, social, and economic points of view.

35. When agricultural insurance is discussed in the context of developing countries, it is usually with reference to the traditional sector. The problem of insurance for the sector is that the farmers are normally below the "threshold of insurability" 17/ for the products offered. Consequently, the schemes are not commercially viable and there is little incentive for the private sector to participate. The schemes are usually managed by a parastatal organization. Risks covered are wide, almost on an "all risk" basis. This is justified on the grounds that a limited peril cover will not be of sufficient interest to small farmers. Premiums are kept as low as possible and are often subsidized. Some actuarial or statistical exercise is undertaken but no margins are kept (or loading factor provided) or, when they

are, they are insufficient. It is held that since the purpose is to help a deprived section of the community, issues such as reserves, and the margin for fluctuations and impurities in data, do not fit in. Furthermore, the farmer is perceived as unable to pay the premium and often the government or a bank or some other organization subsidizes it, although the extent and manner may differ. There is also a practical problem. The number of farmers involved is large, and they are dispersed and often illiterate. It is, therefore, difficult to pay sufficient attention to loss control measures. Agricultural insurance is seen as an instrument of government policy and implemented on a welfare rather than on a commercially viable basis. The end result is that a substantial deficit accumulates and has to be funded by the State.

2. Semi-commercial and emerging sector

36. This comprises small and medium-scale farmers who are in transition from subsistence farming to production for the market. These farmers generally have access to better technology, inputs and irrigation facilities, and are able to benefit from development projects and the support of extension services such as projects for upgrading livestock breeds. This sector would include medium-size farmers producing arable crops such as rice (paddy), wheat, maize, etc., and small farmers producing cash crops such as cotton, sugarcane, tobacco, cocoa, etc. Sometimes they are "adopted" by or have close links to a processing unit. Examples of this are cane growers supplying their output to a sugar mill, tobacco farmers supplying a tobacco plant, or an individual keeping a number of cattle and supplying milk to the marketing board.

37. As is the case with the middle class, the semi-commercial sector in developing countries is expanding quickly and has an important role in achieving productivity gains in agriculture. Opportunities exist for extending and gradually expanding insurance services to this sector.

38. In some countries a State-subsidized insurance scheme implemented by a parastatal organisation may extend to the semi-commercial sector due to an overlap of boundaries with the subsistence sector. However, the schemes that are in conjunction with the coverage of the traditional sector relate to one or two crops only. There is a vast potential to be tapped by extending cover to other crops produced by the semi-commercial sector. It would appear that, because of a preoccupation with the needs of administering welfare-oriented schemes for the subsistence sector on the one hand, and schemes for specialized production systems on the other, the problems of the semi-commercial sector have not been addressed adequately. This sector is vast, however, and, depending on the success of renewed efforts to speed up agricultural development, is likely to constitute an important segment of the rural scene in the next decade or so.

39. The extension of insurance to this category of agriculture will be easier in that the farmers already have some linkage with credit and marketing agencies. These agencies could serve as contact points for the insurance industry. Multinational corporations are active in many developing countries either supplying machinery and inputs (like seeds, fertilizers and pesticides) or processing the produce. Their assistance can be sought for

creating a greater awareness of loss prevention (better irrigation systems, proper seed selection and land preservation) and also for the propagation of agricultural insurance.

40. This sector is not fully commercialized and some of the problems of subsistence agriculture will be present here as well. While trade is commercialized, farmers still have low income levels and may still find it difficult to pay the full premium for a comprehensive cover. A start could therefore be made by providing either a restricted peril cover, or a cover with high franchise or a cover for a proportion of the loss above the franchise. The premium for such a cover would consequently be low and affordable.

3. Commercial farming sector

41. Farms in this sector use modern technology, rely on financing, buy services of various types and utilize marketing channels. The distinguishing feature in comparison with the first two sectors is that the produce is for the market. The scale of operations is large compared to that of the previous sector. Tea, coffee, cocoa, oilseeds and rubber plantations, large food grain or cash crop farms, and dairy or poultry farms are some examples of this sector.

42. In many developing countries this sector has not received sufficient attention from the insurance industry in an organized manner. This is partly because insurance companies often lack knowledge of the subject and feel hesitant in entering an unknown area. It is clear that it will take time to overcome the difficulties. Progress in this area will have to be a gradual process. Another reason for the very poor penetration of insurance in this sector is that the financial institutions providing credit do not always seek the security of insurance. Hence, greater interaction with the banking sector is advisable. At the same time, efforts can also be made to sell the benefits of insurance independently of the requirements of the financial institutions. Commercialization of operations has already taken place and the persons managing the units are generally educated and on the look-out for new ideas. Given some effort, enterprising insurance companies could create a market niche for themselves.

43. Since units in this sector are cost conscious, an approach made by an insurance company at some point in time may not have resulted in the conclusion of a contract. Insurance companies in such instances should go deeper into the requirements of the client and explore all possibilities of arriving at a mutually acceptable basis, as is often done when negotiating a rate for an industrial or a shopping complex. Attention also needs to be given to accident insurance cover for farm workers, and insurance of buildings and machinery. Insurance companies of developing countries may profitably identify this sector as a target area.

4. Specialized production systems

44. This sector represents a further stage of commercialization. Units in this sector employ capital-intensive and information-based processes, using advanced technology. Production consists of non-traditional or specialized

items, often for export. Large aquaculture farms, greenhouses, horticulture, hydroponic vegetable production, and production of vegetables, fruit and flowers under strict quality control for export are some examples. In a number of developing countries these activities are rapidly increasing, and becoming a source of foreign exchange. Governments and the banking institutions are supporting the growth of this sector. In many cases the insurance companies have provided the necessary cover with reinsurance backing. However, considerable untapped opportunity remains. It will be desirable for insurance companies to pay attention to prospecting business in this sector on lines similar to the efforts made to book business in the industrial sector. The extent of flexibility and keenness shown in negotiating insurance of an industrial complex should be exhibited here also.

45. Insurance is an important variable in the management of these entities because of the large capital typically involved. Insurance will affect the choice of technology through two separate mechanisms. First, it will facilitate the adoption of improved technology by reducing exposure to risks. In addition, it will strengthen measures for risk management through codes and practices requiring minimum standards to be observed.

G. History of agricultural insurance

46. Mutual sharing of risks in informal ways, including in the agricultural sector, has been practised in various societies since time immemorial. At the formal level, one of the first statements on agricultural insurance was made by Benjamin Franklin in 1788. Observing the effects of natural hazards on the French farmers he wrote that insurance would have prevented the hardships. Subsequently, specific peril cover was introduced in the United States of America and in Europe by commercial companies and farmers' mutual insurance societies. Efforts to introduce multi-risk or all-risk covers in the United States of America towards the end of the nineteenth century failed as indemnity was on the basis of any loss of income including prices.

47. In the 1920s, the International Institute of Agriculture, the forerunner of the United Nations Food and Agriculture Organization (FAO), made several studies of agricultural insurance. The Assembly of the League of Nations initiated a survey of agricultural insurance systems in the world by asking its Economic and Financial Organisation "to undertake a study of systems of agricultural credit and insurance with a view to the elaboration of principles calculated to strengthen internal and external credit and suitable for adoption by countries contemplating a modification of their existing legislation". A report was made by Louis Tardy in 1938. 18/ Crop insurance laws were passed in the United States of America and Japan in the same year. The compulsory cotton insurance programme in Brazil, which started in 1939, and the establishment of the Banana Insurance Board through an enactment in 1943 in Jamaica are two early efforts of institutionalized agricultural insurance in the developing world.

48. The subject of agricultural insurance has attracted attention in recent years. Several discussion and working groups, conferences and seminars have been organized to examine the issues and make recommendations. Unfortunately, the outcome of these meetings are not properly catalogued and are not readily available. The FAO Regional Meeting on Food and Agricultural

Programmes and Outlook in Asia and the Far East, held in India in 1953, recognized the importance of crop and livestock insurance and recommended that a working party should look into the subject. Subsequently, a working party met in Thailand in 1956 to study the subject. In 1974 an International Seminar on Agricultural Insurance was held in Egypt. The UNCTAD Committee on Invisibles and Financing related to Trade, at its seventh session, in 1975, identified agricultural insurance as one of the priority needs of developing countries, and subsequently a study on Crop Insurance for Developing Countries was presented and discussed at its 1980 session. 19/ A symposium on crop insurance was organized by UNCTAD in collaboration with the United Nations Development Programme (UNDP) in Sri Lanka in October 1979. FAO has continued to deal with the subject. Under its auspices, an ad hoc Conference was held in Israel in 1972, and in 1980 a Regional Consultation was organized in collaboration with the Asia and Pacific Regional Agricultural Credit Association in Thailand, and again in 1986 in China. FAO has held Expert Consultations in 1986, 1989 and 1992.

49. The Inter-American Institute for Cooperation on Agriculture (IICA) has been involved with insurance schemes in a number of Latin American and Caribbean countries, and a conference held in Costa Rica in 1982 discussed the subject of crop insurance. The Third World Insurance Congress (TWIC) has been discussing the subject in several of its sessions, particularly in Morocco in 1985 and in China in 1986. At its 1985 session a recommendation was made to hold regional meetings among countries similar in geography, language and culture. To this end a seminar was organized in Panama in 1985, and the Latin American Agricultural Insurance Association (ALASA) was formed. It has since been holding annual seminars. The Eighth African Insurance Congress held in 1981 in Zambia recognized the importance of agricultural insurance. The Asia Productivity Organization held seminars on crop insurance in Japan in 1986 and 1990. An agricultural insurance seminar was organized by the Government in 1990 in Zimbabwe. The French reinsurance company SOREMA held seminars in France in 1989, 1991 and 1993. Numerous other discussion meetings and seminars have been held in many other countries at national and regional levels. Awareness of the need to develop agricultural insurance is increasing, and at the same time there is a better appreciation of the attendant problems. Some literature has also emerged, written by agricultural economists and practitioners. A brief bibliography appears at the end of this study.

H. Methodology and arrangement of chapters

50. To gather background information for this study, a questionnaire was sent to various Governments of developing countries, together with a note verbale from the Secretary-General of UNCTAD in March 1991. A summary of the replies received appears in chapter X. In many cases the statistical portion was deficient in the replies. This is possibly because in many countries the statistical information is not compiled or readily available, or did not fit into the framework of the questionnaire.

51. In addition to the questionnaire, relevant information and agricultural insurance schemes were obtained from many sources. Discussions were held with a number of persons involved in the business, both in the developed and developing countries. The study does not purport to be exhaustive, but is a

general survey of the status of agricultural insurance in the developing countries and the various issues linked with it. It is indicative rather than comprehensive. In particular, the examples cited of countries are based on available information and are illustrative only, as it is apparent that many other examples and models exist. Certain suggestions emerge which need to be explored further.

52. It should to be mentioned here that much can be learned from the experience of the developed countries; indeed, the modern insurance system is based on the pattern that evolved there, and the opportunity must be taken to benefit from the lessons accumulated by various countries. Administrative arrangements made in the areas of risk evaluation, information, and loss assessment would be of special interest to developing countries. Mistakes made, or problems encountered, should be studied so that these are avoided. There is no conflict or divergence of interests here. References have been made wherever possible and relevant to practices in the developed countries, but the study concentrates on the developing countries, particularly when discussing models of agricultural insurance schemes.

53. As regards the arrangement of the chapters in the report, Crop Insurance is discussed in the following chapter, i.e. II. This subject has attracted a great deal of attention, and is also the largest single component in agricultural insurance. The chapters on Livestock, Poultry and Aquaculture Insurance follow. Next is a discussion on general insurance in and relating to rural areas, other than the main lines of business. In view of the suggestion that the extension of existing insurance services to rural areas should be the first step for urban-based insurance companies, this chapter has a special significance. The following chapter (VII) on Developing Insurance Markets in Rural Areas covers another vital aspect. Chapter VIII is devoted to the possible options of the Organizational Structure required for propagation of agricultural insurance. It is followed by a chapter on the various aspects of Reinsurance, which is an important element of the insurance system. The selected replies to the questionnaire sent to various developing countries are presented in chapter X. The study ends with a chapter containing Concluding Observations on important policy and strategy issues concerning agricultural insurance in developing countries. A short bibliography is annexed.

54. Details of a few selected schemes relating to agricultural insurance are published in a separate volume. It must be emphasized that it will be inappropriate to adopt any of the schemes in the form presented, as they are only indicative of the elements that could go into the design of a scheme. The local environment and other country specificities must necessarily be reflected in any scheme devised for operation in a given situation.

Chapter II

CROP INSURANCE

Introduction

55. Since the production of crops is the most important segment of agriculture, crop insurance is the major component of agricultural insurance. In answer to a questionnaire on agricultural insurance sent by the UNCTAD secretariat to the developing countries, 44 countries/territories reported some form or other of agricultural insurance, and of these, 25 countries or 57 per cent reported offering specific insurance for crops. Crop insurance was reported to be a regular feature in 19 countries or 76 per cent of them. Its problems are also the most diverse of the different types of agricultural insurance. In this chapter the design of schemes is first considered with respect to crops covered, scope of cover, premium rate, indemnity and assessment of losses. Examples of Chile, Cyprus, the Dominican Republic, India, Mauritius, the Philippines, Sri Lanka, Venezuela, the Windward Islands, Zambia and Zimbabwe are cited. This is followed by a discussion of some specific issues concerning the four sectors of agriculture examined in the previous chapter. Specific problems of insurance design are highlighted and some recommendations given to address them. The chapter concludes with some general observations on crop insurance in particular, and agricultural insurance in general.

A. Coverage of crops

56. Which crop, or crops, are taken up for insurance will depend upon a number of factors. If the cultivation of one or two crops constitutes the bulk of the agricultural activity of a country or territory, for example sugarcane in Mauritius and bananas in the Windward Islands, the choice is obvious. In countries where a number of crops are grown, primarily two factors are important: the sector of agriculture meant to be served and the stability of the cultivation system. The priorities of the Government in the field of agricultural support and development strategies will prevail when the targeted groups are the traditional and the semi-commercial and emerging sectors, particularly when the initiative has been taken at its behest. It may take into consideration, amongst other factors, the crop or crops whose cultivation it wishes to encourage. The stability of the cultivation system may also be taken into account but, on the whole, the importance of the crop to the country's economy and the extent of its cultivation are the crucial aspects. A parastatal body is often involved with such efforts as the implementing agency. On the other hand, for insurance programmes for the commercial sector, particularly when undertaken by private insurance companies, the stability of the cultivation system is the prime determinant. If the technology used, methods employed, inputs, etc., are generally standardized and have stabilized, the output is likely to be less variable and measurable, except when an outside influence intervenes. A satisfactory level of commercialization will have been reached, and insurance will be easier and economically viable. Thus, the more commercial the crop, the more

readily it fits into an insurance programme and is usually easier to manage. 20/

57. In some countries these issues have been resolved by the law requiring insurance to be provided for specified crops. In the countries cited as examples, the crops selected for insurance (and the insurers) under present programmes are as follows: Crop insurance in Chile commenced in 1981 and is provided by a private sector company. It caters to the needs of large and well-established farmers who are commercially oriented, and insures fruit, cereals and rapeseeds. The scheme is voluntary, and a tie-up with credit is not required. However, the programme has been reduced in recent years. The scheme operating in Cyprus since 1977 is managed by a parastatal organization, the Agricultural Insurance Organisation, which insures a wide variety of crops, namely, cereals, citrus and deciduous fruit, grapes, forage crops and potatoes. It covers all sections of farmers as, by law, all persons engaged in agricultural activities, except those with less than a stipulated minimum landholding, must insure. There is no linkage with credit. In the Dominican Republic the Aseguradora Dominicana Agropecuaria (ADACA), a parastatal organization established in 1984, insures a wide variety of crops, ranging from rice to beans, maize, sorghum, coffee, cacao, onions, garlic, tomatoes, bananas, watermelon, cotton, pineapple, tobacco, yucca, potatoes and oranges. It is linked to credit and caters to small subsistence farmers. In India the Comprehensive Crop Insurance Scheme is managed by the State-owned General Insurance Corporation (GIC), which is the holding company for the four public insurance companies. The Scheme started in 1985 and is designed for the traditional sector small farmer. It is linked to credit. The crops covered are rice (paddy), wheat, coarse grains, pulses and oilseeds. Uniform low rates have been fixed for the whole country for specific groups of crops, avowedly to help the small farmers, and the risk is fully borne by the State and Central Governments with the GIC contributing 50 per cent of the administrative expenses. In addition, the four subsidiary insurance companies of GIC are developing named peril and input-based covers on an experimental basis for a number of horticultural crops and plantations, including grapes, citrus fruit, bananas, pomegranates, sugarcane, rubber, eucalyptus, and poplar timber. The Sugar Insurance Fund in Mauritius was established in 1946 and insures sugarcane which is grown extensively in the country. All cane growers are required to insure. Thus, all farmers, small and large, are covered, irrespective of linkage with credit. Consideration is now being given to insuring tobacco and tea. In the Philippines, the Philippine Crop Insurance Corporation, a parastatal organization, commenced crop insurance in 1981 with insurance of rice, and corn was added in the following year. Insurance of tobacco began in September 1991. It is compulsory for those who obtain credit from banks, but a sizeable number of self-financed farmers have also been insured. Both small and large farmers are included. However, even the small farmer is generally educated and aware of the insurance system. 21/ For crops (and also livestock) not covered under the schemes, a credit guarantee (Comprehensive Agricultural Loan Fund, known for short as CALF Guarantee Programme) is run in conjunction with the Department of Agriculture through the Agricultural Credit Policy Council. Loans granted to farmers by an approved banking institution or a non-banking lending "conduit" (farmers' cooperatives, farmers' organizations, other non-stock and non-profit

non-governmental organizations or foundations) are guaranteed to the extent of 65 to 85 per cent of the unpaid balance of the loan for a fee equivalent to 2 per cent of the loan. In Sri Lanka the Agricultural Insurance Board was established in 1973, and insurance for paddy is linked to credit. Insurance is primarily for small farmers. In recent years, insurance schemes have been developed for a number of "subsidiary" crops grown in selected areas. Some of these are: green gram, cowpeas, soybean, maize, seed bean, betel, rubber, cotton, tobacco, sugarcane, tea, rubber, pineapples, passion fruit, ginger, chilies, gherkins, potatoes, onions and a few export crops, including flowers and medicinal herbs. In Venezuela, the Aseguradora Nacional Agricola (Agroseguros), a State organization, was established in 1980 to offer insurance, closely linked to credit, to marginal and poor farmers. Crops covered are cereals, sugar, coffee, vegetables, fruit, roots and tubers, oilseeds and fibre crops. The programme has been recently given up. In the Windward Islands insurance of bananas, which are the main crop, is managed by Windward Island Crop Insurance Ltd. (WINCROP), established by an enactment in 1988. All registered members of WINBAN, the apex marketing organization of bananas, are required to insure. Thus, all banana growers, small and large, are covered. In Zambia the State-owned Zambia State Insurance Corporation offers insurance on a number of rainfed crops, such as maize, soybean, cotton, sunflower, groundnuts, sorghum, barley and wheat. The present scheme is in operation since 1980, and is on a voluntary and individually selected basis. It is directed towards insuring commercially-oriented farmers. However, recently a group policy (Lima, meaning the plough) has been devised to cover small farmers, through the intermediation of cooperative societies and banks. There is no direct linkage with credit. In Zimbabwe private sector insurance companies are insuring tobacco and several other crops on a voluntary and individual basis. Wheat insurance is linked with the Grain Marketing Board and the Zimbabwe Cereal Producers Association and caters mostly to the needs of the commercially-oriented farmers.

B. Scope of cover

58. The most important and common perils to which crops are exposed are: fire (including lightning), hail, frost (including snow), windstorm or atmospheric disturbance (including hurricane, tornado, cyclone or typhoon), rainstorm (including excessive or unseasonal rain), flood (including inundation), drought (including heatwave or excessive heat), damage by birds or animals, malicious damage (including vandalism), convulsions of nature (such as earthquakes, landslides, avalanches or volcanic eruptions), and pests, insects and diseases. When the damage occurs at an identifiable time, and is of short and sudden duration, such as fire, hail, and convulsions of nature, the perils are manageable. Frost, windstorm, rainstorm and flood are the intermediary categories of risks where the cause of the loss, or the proximate cause, is still determinable but the farmer has an influence on the extent of the loss. Pest infestation (except locust attacks) and diseases and damage by birds and animals show up gradually and it is difficult to establish whether the farmer took sufficient care to avert the damage. Risk of drought, although the most important from the farmers' point of view, is difficult to insure due to its very wide-ranging impact and non-independence of random events. Furthermore, there are several stages of lack of moisture in the soil and it is difficult to define for insurance purposes when exactly a drought has set in. Causewise analysis of losses in developing countries

is not available, but according to the experience of the Multi-Peril Crop Insurance Programme in the United States of America, which has a wide spread of crops and climatic areas, 57 per cent of losses during 1981-1988 were due to drought. 22/

59. War and nuclear-related risks, as well as financial losses due to price fluctuation, are excluded. This is in line with the practice in other types of insurance contracts. Loss of quality is also generally excluded, but for certain crops quality is of great importance. Insurance for loss of quality for the commercial sector may be considered after a careful examination of various aspects of insurability and the methodology adopted for assessing the extent of quality loss. Loss of quality is covered for flowers and fruit in Israel, and for tobacco in Zimbabwe.

60. Crop insurance programmes can be broadly grouped in two categories: single or named peril, and multi-peril or comprehensive or all risk. A programme is regarded as single or named peril when one or a few identifiable and specific perils are insured, and as multi-peril or all risk when compensation is provided if the yield falls below a specified point "how so ever caused". Conceptually, multi-peril insurance is not the same as all risk. However, in practice, each of the perils influences the other in a multiplier manner, and when a large number of perils are insured it almost becomes an all-risk cover, and hence the two are treated in the same category. According to the answers given to the questionnaire circulated by the UNCTAD secretariat, out of 25 countries offering specific crop insurance, 20 countries or 80 per cent do so on named peril basis, and 5 countries or 20 per cent on all-risk basis.

61. One of the most important insurance programmes in the developing countries where limited coverage is provided is that of Mauritius. For the first 27 years only the risk of windstorm damage to sugarcane extensively grown in the country was covered. Risks of fire and excessive rainfall were then added. Losses caused by yellow spot if in conjunction with excessive rainfall have been included since 1984, since it is a consequential event. The extension in coverage has been cautious and is still limited compared to other countries. The programme has stood the test of time, and has worked well since the conditions are controlled, the geographical spread is limited, and an economic premium can be collected owing to favourable terms of cultivation. In Venezuela a variety of crops are covered against drought, excessive rain, flood, strong winds, fire caused by lightning or spontaneous combustion, pests and diseases not controllable by technical processes. In Chile insurance aimed at commercially-oriented farmers covers fruit, which are insured against hail, flood, wind and rain, and cereals against rain and drought. The Cyprus programme is limited to hail for deciduous fruit, hail and frost for grapes and citrus fruit, and hail, rust and drought for cereals. In the Windward Islands the cover for bananas is for damage due to windstorms only. The programme is also young. In the Dominican Republic programme, which is also in its early stages, the perils are named, although fairly wide including drought. In the Islamic Republic of Iran where crop insurance is managed as an ancillary activity by the Agricultural Bank, the risks covered are rain, storm, flood, hail, early winter frost, and wind damage. The risk of drought is excluded. In Zambia two schemes are offered. The first scheme covers fire and lightning only, and the second extends to

flood, storm, riot and strike, malicious damage and drought. In Zimbabwe private insurance companies offer insurance essentially against fire and lightning, but optional covers such as earthquake, explosion, riot, malicious damage and hail are also available.

62. Insurance of crops in Europe has primarily been against hail damage despite the sophistication achieved in agricultural operations and a well-developed insurance sector. In general, hazards faced by farmers are less severe and more localized than in developing countries. European farmers are also better able to control risks. Hail damage is the main risk beyond their control. The business on the basis of the limited cover of hail has been profitable. Insurance organizations in the former East European countries have been providing wide covers to their agricultural sector, but there was a lack of financial discipline and losses incurred by them were being met by the State. In the context of the recent changes aiming at market-oriented economic structures, the schemes are in various stages of revision on the pattern of limited perils in Central and Western Europe. In the former Czechoslovakia and in Hungary all-risk insurance has already been replaced by named peril insurance, covering hail, spring frost and storm.

63. On the other hand, programmes of comprehensive insurance against crop failure have been operating in Canada, Japan, the United States of America, and Sweden. Conditions are better controlled, and long-term data are available. Nevertheless, the financial results of these programmes have been negative, despite the fact that no traditional or subsistence farmers are involved. Countries in the developing world where all-risk cover has been provided are India, Sri Lanka, the Philippines and the Republic of Korea. The scheme in India has incurred losses and a number of operational problems have been encountered. The scheme in Sri Lanka has also resulted in losses, and the delay and inability to fund the deficit has restricted the Agricultural Insurance Board in increasing the coverage. The results of the scheme in the Philippines have also been in the red, although to a much lesser extent. A decision is now reported to have been taken to withdraw the subsidy over a period of five years, 23/ and the farmers' response to much higher premiums will have to be watched.

64. Wide-ranging discussions have taken place in knowledgeable circles, both in the contemporary literature on the subject and in learned forums, about the extent of coverage of crop insurance schemes. The recommendation that programmes of multi-peril or of a comprehensive nature do not serve much purpose, particularly for crop insurance schemes designed for the traditional and emerging sector farmers, is supported by FAO. 24/ Several reasons have been given for this conclusion, which is based on empirical experience from a variety of programmes, both in developed and developing countries. First, the insurance cover provided is usually unsuited to the specific circumstances of the farmers, demonstrated by the fact that few would voluntarily purchase it (except those with a proven high risk factor) as a means of managing climatic uncertainties. Insurance for normal yield variations in a way encourages poor farm management and provides the farmer with an easy way out. It is argued that he should, on the contrary, be supported to manage the risks more directly. Second, although highly subsidized and compulsory for certain categories of farmers, the schemes in practice cover only a small part of them; and, in fact, the main

beneficiaries have been the stronger elements in the farming community. Third, there is little, if any, evidence to demonstrate the welfare gains that are assumed or claimed to accrue. In particular, there is no evidence to show that performance of lending institutions has improved or that the flow of credit has increased because of the insurance provided. To the lending institutions, risks other than those covered by insurance are more important, and crop insurance is no substitute for the basic creditworthiness of the farmer and the viability of the operations. Furthermore, it has not been established that the adoption of better technology or an attempt to manage risks more efficiently has been facilitated by insurance. Fourth, it has not been possible to set premium rates and indemnity payable realistically, or to have a mechanism for judicious assessment of losses. Premium rates are usually set arbitrarily on the lower side; to charge the required economic premium would be politically unsustainable. What is worse, little or no effort is made to adjust the premium, or the indemnity payable, as experience accumulates. (In this connection, it is interesting to note that, according to the answers given to the UNCTAD questionnaire, 14 out of 25 countries offering specific crop insurance reported that premiums do vary according to claims experience.) Furthermore, it is usually difficult, both administratively and politically, either to keep those who produce losses out of the programme, or to enforce impartial loss adjustment. Fifth, disproportionately high administrative costs are incurred, particularly if efforts are made to check moral hazard problems. Sixth, to make up for these deficiencies (and for many others, particularly since the programmes are usually run by parastatal bodies), a substantial amount of subsidy is required. If the idea is to encourage agricultural productivity, this does not take place; on the other hand, the subsidy becomes a locked-in commitment without explicit sources of funds. Thus, the resources of the State are in effect not utilized productively. It is inferred that, for countries with budgetary constraints, the amount needed to support such insurance programmes could be much better used directly for the benefit of farmers.

65. Table 4 shows the loss ratios (loss paid as a ratio of premium) of the crop insurance programmes in developing countries/territories referred to above during the last few years.

Table 4

Country/territory	Loss ratio (percentages)	Years
Chile	41.47	1986-1990
Cyprus	78.8	1986-1990
India	686.53	1986-1990
Mauritius	54.35	1986-1990
Philippines	121.17	1986-1990
Sri Lanka	174.08	1986/87 (Maha only)- 1989/90
Venezuela	56.33	1987-1990
Windward Islands	72.24	1987-1990
Zambia	67.28	1985/86-1989/90
Zimbabwe	20.65	1986-1990 (tobacco)

Source: FAO *Crop Insurance Compendium 1991* (Rome, 1991).

C. Indemnity

66. There are two principal systems of indemnity under crop insurance. First, if the yield falls below a stipulated level due to the insured peril (which can be single, multiple, or all risk), the farmer is indemnified for the value of the shortfall in the yield. In this case it becomes necessary to wait until the crop cycle is complete to assess the shortfall. Furthermore, the management of the farm is the key element in the final outcome of the yield. The problem of moral hazard, therefore, assumes key importance. The second basis is to indemnify the farmer only for the variable investment made by him, or the input costs incurred up to the time of occurrence of the peril. Practices differ, but some of the items of expenses included in the calculation of the production costs are those pertaining to seeds and their treatment, land preparation, sowing and planting, fertilizer, synthetic hormones and micro-elements, herbicides and other weed and pest control, provision of moisture, labour charges, harvesting operations, and other costs legitimately incurred. Sometimes the interest to be paid on the loan taken, insurance charges and a percentage of input expenses to represent the profit element are also included. The input cost basis provides a lower indemnity and hence the premium is lower and more affordable. Since it would be difficult to establish the actual costs incurred (in the absence of properly maintained accounts), and also to avoid arguments and disputes, often a scale of progression of input costs to coincide with the crop cycle is worked out in advance and made the basis of the indemnity. The schemes in the following countries are based on the yield concept: Algeria, Cuba, Cyprus, India, Mauritius, Morocco, Sudan, and Tunisia. Cost of inputs is the basis of indemnity in the schemes in the following countries: Argentina, China, the Dominican Republic, Ecuador, India (horticulture, sugarcane), Indonesia, Islamic Republic of Iran (rice), Israel, Jamaica (coffee), Malawi, Malaysia, Mexico, Mongolia, Nigeria, Panama, Sri Lanka, Thailand, Uruguay, Venezuela and Zambia. In Madagascar, the farmer is given the choice of opting for yield-based or input-based indemnity. In the Philippines, both systems are used. In Zimbabwe, the yield is the basis for wheat and barley, and input costs for other crops.

67. Agricultural operations are characterized by much higher fluctuations than is the case with other economic activities. Minor fluctuations occur even in normal years, and quantification is always a problem. It is necessary therefore to avoid small recurring claims due to minor variations from one crop cycle to another. The situation is somewhat akin to a stop loss reinsurance contract, where the reinsurer does not step in to stop the loss until the insured company has borne the loss up to a specified extent. A cut-off point is therefore stipulated, which has to be reached for claims to become payable. The cut-off point is determined on the basis of average yield in the last few years. This principle of a cut-off point is applied to both the yield-based and input-based indemnity.

68. In yield-based insurance schemes, therefore, the actual yield has to be below a stipulated threshold yield before insurance indemnity is payable. Under the scheme operating in India it is 90 per cent, 80 per cent and 60 per cent of the average yield in low-, medium- and high-risk areas

respectively, classified on the basis of the coefficient of variation in the yield data over the last five years. The amount of indemnity thus equals:

$$\frac{\text{the threshold yield} - \text{actual average yield of the area}}{\text{threshold yield}} \times \text{sum insured.}$$

69. The Philippine scheme makes a further refinement. A loss is compensated if it is more than 10 per cent of the average yield. If the loss is partial and the farmer is able to continue profitably with the cultivation up to harvesting, the indemnity payable is:

$$\frac{\text{the average normal yield} - \text{actual yield}}{\text{average normal yield}} \times \text{sum insured.}$$

However, if the damage occurring at an early stage was up to or beyond 90 per cent, and the crop was terminated, the farmer has saved his labour and further inputs. He will be indemnified only to the extent of the actual cost of inputs already incurred, or estimated cost of inputs appearing in the farm plan or budget. There is a further deduction. Franchise (loss, in amount or as a percentage of total loss, which must be attained before the insurer becomes liable to pay) and deductibles (the part of a loss, in amount or a percentage, which has to be borne by the insured) are common in various forms of insurance. These are necessary, first, to control moral hazard and, secondly, to enable the insurance company not to become involved in the processing of minor claims which eventually turns out to be too costly to both sides. For crops damaged by natural disasters the first 10 per cent of the loss has to be borne by the farmer as a franchise, and for pests and diseases the first 10 per cent of the loss operates as a deductible.

70. In Mauritius a refined system of relating the indemnity to the past claims experience of the grower has been built up. Outputs of cane grown by various farmers are ranked from 1 to 100 depending upon their earlier records, and an indemnity ranging from 55 per cent to 80 per cent is paid according to a formula, after obtaining information on the actual sugar produced out of the respective farmer's cane from one of the 19 milling plants where all cane grown in the country is processed. Computerized and detailed records are kept. The system works well as the conditions are controlled, detailed yield data over a long period are available, and the geographic spread is limited. Two additional interesting mechanisms are available. First, there is a provision for negotiating from within the sugar industry a special levy in times of difficulty. Secondly, there is a provision for the Government to reduce compensation payable in accordance with the amounts the Mauritius Crop Insurance Fund has in reserve. In Cyprus a deductible is first applied, ranging from 15 per cent for damage due to hail to 45 per cent for damage due to drought, and then 72 per cent of the net amount is paid. If the loss is due to frost, only 60 per cent of the amount is paid after application of the deductible. The law also provides that if the available funds are insufficient to meet all assessed losses, they can be proportionately reduced with the approval of the Government. In Venezuela pre-set cost schedules have been established for various crops, and the sum insured is set at 60 per cent of these costs. Indemnity is paid on the basis of assessment of the costs incurred up to the time of the loss. In

Zambia indemnity is limited to agreed production costs, and with an excess of 10 per cent.

D. Premium rate

71. In designing a crop insurance programme the determination of the premium is of the utmost importance. On the one hand sufficient revenue has to be generated to meet the payment of claims, but on the other the premium should be perceived as reasonable and affordable.

72. A standard actuarial model for calculating the premium for crop insurance has not yet been developed. Specific formulas have been devised in different countries depending upon the parameters and variables of their programmes. It may be mentioned that in the literature on the subject the methods of calculation are better developed for yield-based than for input-based insurance. 25/ This is primarily because the past pattern of yields can be more readily determined. There is a need to compare the premium determination methods used in different countries, particularly for input-based insurance, so that a prototype can be established. In what follows, the various factors that have to be taken into account in devising a suitable formula are briefly discussed. The section ends with a simple general formula which serves the limited purpose of indicating the principal issues. A more detailed and specific model will need to be developed for different programmes.

73. The losses vary from year to year and an annual average based on historical data of a few years has to be first established. This may have to be modified to take care of the trend of losses, whether increasing or decreasing, to determine the quantum of losses expected to be paid in the coming years. In other words, in estimating the annual expected losses likely to be faced in the coming years, the past pattern of losses may have to be modified to take into account, inter alia, the changes in farming technology and climatic changes. This will then require adjustment, by way of loadings for several factors, which can be broadly grouped into two categories: those relating to the risk, and the others to provide for administrative expenses. The first element in the risk category is the actual distribution pattern of losses. It is usually hypothesized that as the size of individual losses increases the probability of their occurrence declines. Thus, a Normal Distribution pattern around the average yield is presumed. But this need not necessarily be the case, and loading may be necessary in view of the actual skewness of distribution. Second, a loading may be necessary to meet the problems of moral hazard and anti-selection which are ever-present. Attempts are sometimes made to counter these problems by providing partial insurance, by keeping the threshold yield for entitlement of indemnity low or by reimbursing only a part of input costs. 26/ However, there are limitations to the extent to which this can be done from a marketing point of view, and a loading may have to be provided. Third, a loading is required for creating reserves. This is essential because diversification of the portfolio may not solve the problem of co-variability. Thus, in developing a viable insurance programme, reserves have to be built up to answer the problem of the potential distribution of natural calamities or catastrophes affecting a large number of risks simultaneously. 27/ A question that has to be addressed in connection with

the creation of reserves is their size. Insurance companies usually endeavour to build up reserves over the years as a measure of improving their general financial strength, but as far as crop insurance programmes are concerned, reserves need to be created only to the extent necessary to meet the requirements of the programme. Fourth, loading may be required in view of the likely impurities in the data. Fifth, possibilities of climatic changes and fluctuations may also necessitate a loading. Sixth, a negative or positive loading would be required to take care of the timing of the production cycle and payment of claims relative to the time the premium is received. For the year, if the premiums are received ahead of claim payments, an investment income will accrue to the insurance company. On the other hand, if premiums are received at the end of the cycle or spread over the cycle, as is often the case, a provision is necessary for financing payment of claims. 28/ Lastly, since it is not possible to achieve a balance between premiums and claims on a year-to-year basis, a period of, say, five years (depending upon the meteorological features) has to be taken, during which a balance can reasonably be expected to be achieved. A financing cost has to be provided as loading for the year-to-year imbalance. All these elements produce a final loading factor for assumption of risks, and the sum total of the expected annual losses and the loading broadly gives what may be described as the net premium. This has to be further adjusted by a loading factor for administrative expenses necessary to run the programme. These would include not only establishment and acquisition costs, but also expenses incurred or estimated to be incurred for research, for creating awareness of insurance and publicity, etc.

74. The above discussion provides the following simple formula:

$$\text{Gross Premium} = \frac{[E(L) + s]}{(1 - x)}$$

where $E(L)$ = Expected losses
s = a loading factor for risks assumed
x = a loading factor for expenses.

75. It should be emphasized that it is necessary to keep the loadings, both for risks assumed and for administrative costs, as modest as possible. The general perception is that generous and substantial loadings make the resultant gross premium payable highly unfavourable and disadvantageous to the insured. This is in fact one reason why crop insurance has not spread to the extent it should have; those who need it most are unable to afford the premium. It may be added that it is not unusual in industrial and commercial insurance for a technical rate worked out by a careful assessment of risk to be discounted on an ad hoc basis on marketing considerations. Wherever necessary, a similar facility could be extended to agricultural risks as well.

76. The insurance supervisory authorities in many countries function as a watchdog and arbitrator in the premium rate fixing process, both in life and non-life business. If the necessary skills are available in the office of the supervisory authority, it could have a role in respect of determination of the premium for agricultural risks. Typically there are not many players in this line in the developing countries and the market is oligopolistic or

more usually monopolistic. Particular attention has to be paid to the loading factors used. At the same time, it has to be admitted that data are woefully absent, and mathematical calculations based on actuarial concepts are often difficult to make. A wide range of estimations and interpolations have to be made. It is a new area requiring a high degree of innovativeness, and a degree of conservatism has to be allowed in the initial stages. There is, however, a need to adjust the premiums empirically over a period of time as more experience is acquired.

77. It is necessary to institute a system for the proper collection of statistics. The veracity of the premium rates ultimately depends not on the sophistication of the actuarial formula devised but on the purity and reliability of the data. Erroneous conclusions can emerge if the data are not satisfactory, in spite of an extremely careful actuarial or statistical analysis. Consequently, sound planning has to be made for generation of data from the field, and their collation. In the beginning the sources of statistics are often the government departments or the extension agencies. However, these statistics would normally have been collected with a different purpose in mind and their utility for insurance purposes may be limited. Statistics from the research bodies and agricultural universities are relatively better. In fact, until statistics have been generated by the programme itself, these are often the only basis on which a beginning can be made. There is another limitation to the statistics and this needs to be acknowledged. Agricultural practices are undergoing a change, and if a longer period is taken they may not be comparable. On the other hand, statistics for a shorter period may not be representative. The period taken will depend upon the perils covered, the frequency pattern of losses and the availability of comparable data. Careful thought should be given to this aspect.

E. Assessment of loss

78. In all forms of insurance, the efficiency of the system employed to quantify the extent of loss is crucial. It has been rightly described as the "cutting edge" of insurance. The importance of a proper system of loss assessment cannot be over-emphasized. This determines the popularity and acceptance of the programme, since the farmer must accept the assessment of his loss as fair and just. If he agrees to the amount passively and in the spirit of accepting whatever comes his way, the credibility of insurance is reduced. A proper system of loss assessment is also vital for the financial viability of the scheme. In agricultural insurance, a large and dispersed area is involved, and there are many leakage points, particularly since accounts and record keeping may not be up to the desired standards.

79. India employs a simple methodology. Losses are not determined in respect of each insured farmer, but collectively for all the insured farmers in the "area", taken as a unit. The fall in yield is established for the area as a whole on the basis of crop estimations through a process of crop cutting on randomly selected plots by the State Government, as required by the National Sample Survey Organization. Claims are settled for all farmers in the area irrespective of their own yields, be they higher or lower than the yield of the area. Efforts are, of course, being made to reduce the size of the area taken as a unit so that it represents a homogeneous region.

Still, the fact remains that variations between the actual yield of the farmers and the area yield as estimated may be substantial. Furthermore, since the area yield is established by an organization not involved with the insurance system, many anomalies arise. This system has been adopted in consideration of the vast geographical spread and the large number of farmers involved, and also to keep the costs to a minimum. The Mauritius system of assessment, on the other hand, is most sophisticated. It is facilitated by the fact that the entire produce insured - sugarcane - goes into a single channel of marketing and processing, and its output records can be relied upon. A field staff of one person for every 155 to 160 farmers keeps constant vigil over the growth of the crop, with four farm inspections during the year.

80. Most of the countries assess losses on an individual basis, even when small and traditional farmers are insured. At a certain point in time, a representative or a team visits the farm and determines the extent of the loss sustained. This, in any case, is almost a prerequisite and an indispensable ingredient of schemes offered by private insurance companies. In Chile and Cyprus, eye (visual) estimation is made of the damage. The system for assessment of loss followed in the Philippines envisages detailed investigation of claims. It works well, but the cost is high. The total administrative expenses come to around 68 per cent of the premium. Although a breakdown of how much of the administrative costs are due to the loss assessment process is not available, the figure appears to be on the high side, even if the expenses do not come out of the premium but out of investment income. On the other hand, the simple method of assessing the shortfall in the yield adopted in India leads to high claims. While each country has to decide which system will produce optimal results, it can be generally stated that a balance has to be struck between a very precise and minute determination of the loss on the one hand, and operating convenience and cost effectiveness on the other. An intermediate approach may have to be explored. A tie-up with existing agricultural extension or development agencies and with credit and cooperative institutions could be a possibility.

81. An adequate level of professional skill and orientation is essential for those connected with assessment of loss. One of the factors inhibiting the growth of agricultural insurance in developing countries is the lack of facilities for assessment of loss. 29/ In the developed countries a cadre of experienced and reliable independent loss adjusters is available. In fact, agricultural loss adjusting is a recognized specialization of the Chartered Institute of Loss Adjusters in the United Kingdom. Utilization of the services of independent surveyors is the accepted practice in industrial and commercial insurance, in both the developed and developing countries. This inspires greater confidence in their impartiality in the minds of the insured. In Chile, part-time independent agronomists are utilized. In most of the developing countries, however, in-house agronomists or other specially trained personnel are used for agricultural insurance loss assessment. The practice of having in-house personnel for loss assessment has arisen partly because the amounts are small and the volume of work has not required a cadre of independent assessors. In some countries assessment is not left entirely to the in-house agronomist, who is only one of the members of an assessment team or a committee. In the Philippines the other two members are a technician of the Department of Agricultural Production and the local

representative of the Department of Agrarian Reforms. In Sri Lanka the village level officer of the Agrarian Services Committee and the Extension Officer of the Agricultural Department are the other members of the committee. When the losses are numerous and heavy the in-house personnel are not able to cope, and often a panel of assessors whose services can be called upon is maintained.

82. As the volume of agricultural insurance expands, steps should be taken to encourage the creation of a cadre of independent professional loss surveyors and assessors for agricultural insurance. Traditional loss surveyors and assessors are not readily available to go to the countryside for small claims, and their charges are likely to be high. Persons can be drawn from agricultural universities, research institutions, and plants processing agricultural produce. In fact, this is being attempted in the Philippines and a training programme has been started.

83. Zimbabwe (tobacco insurance) makes use of the services of experienced growers who have been screened by the company to assess hail damage. Enlisting the services of neighbouring farmers, at least for the first survey, is a good strategy to strengthen the confidence of the community in the insurance system.

84. It is advisable to devise uniform procedures that are easily understood. Written, objective procedures will go a long way in removing the mystery from loss assessment and making it demonstrably fair. This will greatly help in enhancing the credibility of the insurance industry. Zambia has formulated detailed guidelines for loss assessment, with practical instructions for use at the field level. Nigeria has laid down norms and procedures for employment of consultants and others. A mechanism should also be available to review the assessment of an aggrieved insured. Cyprus has a system whereby the assessment made is displayed in the centre of the village and those who want a review may apply for one. A second inspection to review the assessment is made in Zambia if requested by the farmer, but he has to bear the cost.

85. In Chile where insurance caters to the requirements of commercially-oriented farmers, the assessment charges are borne by the farmer. The practice of requiring the farmer to bear all or a part of the assessment expenses will certainly make them more responsible. However, where traditional or emerging and semi-commercial farmers are concerned, this may not be worthwhile, and in fact may be counter-productive if they question the level of expenses incurred.

F. Insurance features of the four sectors

86. In this section the specific problems of each of the sectors are considered and some conclusions drawn for possible designs of sectoral schemes.

1. Traditional sector

(a) Programmes for traditional farmers

87. It has already been noted that crop insurance schemes targeted at small, traditional and subsistence farmers may require premiums and administrative expenses to be subsidized, as also funding of the deficit. Schemes implemented so far in the developing countries have not been particularly successful and most of them have some weakness or other. Some of them have been discontinued or substantially modified. For example, the comprehensive crop insurance programme in Chile, and the drought insurance programme in South Africa have been discontinued. The crop insurance programme in Sweden has also been reduced. None can be taken as a model for other countries. The following observation has been made about crop insurance schemes in Latin America: "It cannot be denied that in Latin America agricultural insurance has been more a system of subsidy disguised as insurance than a true insurance." 30/ And it has been commented in regard to Sri Lanka that: "Paddy insurance in Sri Lanka has turned out to be a service which is of peripheral benefit to a very small segment of the farming community and a financial liability for the State." 31/

88. In spite of doubts about their success, it cannot be concluded that such programmes should not be taken up at all. In view of the externalities associated with agricultural development and the vulnerability of such a vast section of society, a social security aspect is involved. 32/ It has also been contended that what is relevant is that in the long run the aggregate direct and indirect benefits of a scheme - financial, social and psychological - to farmers and society as a whole should balance its total cost, this being shared by farmers, the rest of the community and the State. 33/ However, there are a number of corollaries to this. First, the programme should be based on a careful evaluation of various aspects (in particular, taking into account the shortcomings of existing programmes as identified by FAO and summarized in para. 64) and not in a spirit of benevolence or to seek popularity with the farmers. Second, the decision should be preceded by a study of possible alternative strategies. The productivity and economic condition of subsistence farmers needs to be enhanced urgently but the benefits of insurance can be reaped only over a period of time. The possibilities of a frontal and pointed attack on the "culture of poverty" should not be lost sight of. In other words, the following question should be adequately answered: can the amount likely to be required for the programme of crop insurance not be more productively utilized to help the small and traditional farmers in a direct and visible manner? Third, insurance should be conceived, and provided, not in isolation but as part of a package of services - financial in the shape of facilitating access to credit and providing an opportunity to save, technological in terms of better seeds, fertilizer, pesticides, etc., an effective extension service, and facilities for the transport and marketing of produce. Fourth, the "objectives" of the programme should be clearly outlined. Only when benchmarks and parameters have been defined can exaggerated expectations be avoided and effective monitoring take place. This may seem obvious but in practice it is often ignored, and thus needs to be emphasized. Fifth, the subsidy required to support the programme should be open, transparent and quantified, and not hidden or open-ended. If the community has to bear part

of the cost of insurance schemes for the farmer, the extent of its responsibility should be known. The matter of a subsidy to agricultural insurance schemes is discussed in paragraphs 137-139, and of possible reinsurance support by the State in paragraphs 380-384. In any case, proper budgetary or financial arrangements should be made for timely disbursement of the support. Finally, a regular evaluation and assessment of achievements and failures should be insisted upon. A periodic cost-benefit analysis, based on a systematic and quantitative study of costs incurred and socio-economic advantages derived, is too often glossed over in practice. There should be no hesitancy in taking corrective action and modifying the scheme from time to time. Periodic changes, often radical, have been made in many programmes.

89. The search for a viable and sustainable programme of crop insurance for this sector of farmers must continue. A possible approach would be to have a simpler scheme of a catastrophe cover, which becomes operative and the indemnity payable only when the losses are substantial. This objective can be achieved by having a high franchise. 34/ A franchise of 60 to 70 per cent has been suggested, but this may be too high, considering that farmers generally operate with a margin of around 15 per cent profit, if account is taken of family labour at the cost of hired hands. A franchise of 40 to 50 per cent may be a better option. 35/ In any case, a cover with a reasonably high franchise would have many advantages: premium rates would be low and affordable, problems of moral hazard would be averted, and administration would be simpler. Consequently, expenses would be contained, particularly if the insurance is linked to weather-related perils such as drought, hail, hurricane (including tornado, cyclone or typhoon), rainstorm and flood. It would provide a safety net for the farmers, to ensure that they are not totally disabled and ruined in the case of an event beyond their control. The farmer is, in a way, able to live through and survive normal variations in production by resorting to traditional means of managing fluctuations, and therefore a costly effort to provide insurance for situations he can manage could be avoided. Once the programme is working satisfactorily, it could be gradually and cautiously extended. A proposal of a "National Calamity Insurance Scheme" is, in fact, under consideration in Pakistan, whereby the loss to a farmer due to one of the named perils is indemnified only if it exceeds 75 per cent of the expected yield. 36/ A word of caution must be added here. Since this will be a catastrophe cover, and such events occur only once in a while, it will be essential to maintain continuity.

90. It may be difficult to introduce a high franchise or other radical changes in ongoing programmes, but step-by-step measures should be taken to bring them gradually to the stage of viability. It will be worthwhile to plan new schemes on this basis. Also, new schemes should preferably be on the basis of input-cost rather than yield-based indemnity, in view of the lower cost.

(b) Support by the State

91. Governments have a definite role. Since provision of insurance services to this sector is usually not commercially viable, and the private companies are unable or unwilling to shoulder responsibility, official support becomes

necessary. It would be worthwhile not to treat insurance as a stand-alone activity, but to make it a part of other agricultural extension programmes. One would support the other, and consequently the incremental costs of the package would be lower.

(c) Involvement of other agencies

92. It will also be beneficial to involve various other interested agencies. The insurance sector, the financial institutions, the representatives of farmers and those supervising extension services should be associated with designing the scheme; the exercise should not be completed unilaterally or between one or two interests, but should have wide-ranging participation. Various interests can also be associated with the management by way of representation on the Board or the Committee entrusted with the task of monitoring the scheme. The Board of Directors of the Insurance Fund for Natural Risks in Agriculture Ltd. in Israel has representatives of the Poultry Board, Wine Grapes Board, Union of Arable Crops Workers, Cotton Production and Marketing Board, Farmers' Association, Groundnuts Production and Marketing Board, Fruit Production and Marketing Board, Citrus Marketing Board, Production and Marketing Board of Ornamental Plants, Fish Breeders' Association, Vegetable Production and Marketing Board, Agricultural Union and Agricultural Centre, in addition to representatives of the Ministries of Agriculture and Finance. The Board of Directors of the Mauritius Sugar Insurance Fund in Mauritius has representatives of the Ministries of Economic Planning and Development, Finance, Agriculture, Natural Resources and Environment, Cane Planters and Millers Arbitration and Control Board, Sugar Millers, Chamber of Agriculture, the Mauritius Sugar Authority, and four cane planters.

(d) Insurance and refinancing schemes

93. To encourage financial institutions to provide credit for agricultural activities (and other areas considered important from a developmental point of view, such as the small-scale sector) arrangements have been made in some countries to refinance bad debts through mechanisms such as the Deposit Insurance and Credit Guarantee Corporation in India and Agricultural Credit Guarantee Fund Scheme in Nigeria. There could be an overlap between agricultural insurance and these systems since both cover risks associated with credit. This aspect should be looked into. In particular, benefits under such a scheme should not be a discouragement for insurance, as the latter is a better institutional arrangement to deal with risks. A close understanding and working arrangement should also be established between the two systems.

(e) Obligatory versus voluntary insurance

94. It is difficult to reach traditional sector farmers individually, since the cost of delivery and servicing is likely to be prohibitive. Furthermore, problems of anti-selection and a limited spread of risks can be mitigated if all are insured. Hence, practical considerations may require the programme to be automatic or obligatory, either by mandating all those who get directional soft credit to take insurance as in India, Sri Lanka, the Dominican Republic, the Philippines and Venezuela, or by legislation as in

Cyprus and Mauritius. Legislative frameworks for crop insurance exist in Brazil, Costa Rica, Cyprus, the Dominican Republic, Israel, Jamaica, Mauritius, Mongolia, the Philippines, Puerto Rico, Sri Lanka and the Windward Islands. It may be added that the persons covered in these countries/territories are not necessarily traditional or subsistence level farmers, even though they are small in terms of operations. Many of them may be more accurately classified as belonging to the semi-commercial and emerging sector. However, as has been noted, there is often an overlap between the two groups and a national programme of crop insurance often encompasses both groups.

95. Compulsory versus voluntary participation is often a subject of debate. It is true that compulsion is generally not a desirable approach and often hides or gives rise to more problems than it resolves. For our purposes, however, the area where there could be a difference of perception is limited. Compulsory or obligatory insurance is considered in the context of the requirements of the traditional farmers, and is seldom advocated for commercially-oriented farmers. Furthermore, what is described as compulsory is often an arrangement of automatic insurance for a group of farmers, such as banks requiring insurance when credit is given. Banks normally insist on insurance when credit is extended to clients in the organized trade and industrial sector, and extension of the practice to the agricultural sector cannot be faulted. The issue, therefore, relates to instances when all farmers are required to insure as a matter of policy irrespective of credit arrangements. There are not many instances of this type, and in the country/territory examples discussed it is found only in Cyprus, Mauritius and the Windward Islands. Although these programmes are obligatory for the sake of having a wide base, the interests of various sections have in fact been safeguarded, and there does not appear to be any distortion. These programmes are comparatively more successful than others. It is suggested therefore that practical rather than ideological considerations should be the main factor. Whenever a representative cross-section of farmers for whom the programme is designed is likely to respond on a voluntary basis, such a course should obviously be preferred. However, the response could be poor, not because farmers do not like or are not interested in the programme but because of other factors, such as illiteracy or inadequate access to facilities, or deficiencies of the implementing agency in conveying the details to them. This is often the case in developing countries. Therefore, if a general programme is regarded as being in the larger interest, there should be no objection to formulating it on an automatic or obligatory basis. It may be mentioned that, among the developed countries, crop insurance programmes are compulsory in Japan and Sweden.

(f) Insurance independent of credit

96. Insurance as an adjunct to credit is a practical approach, but a conceptual limitation has to be acknowledged. Subordination of insurance to credit does not encourage development of "insurance culture" 37/ The benefits of insurance are not appreciated for their own worth, and insurance is perceived only as a requirement to be met for the satisfaction of the bank. This is one of the reasons for the lack of better appreciation, and consequently awareness, of insurance as an important financial instrument. Attempts, therefore, must be made to provide insurance to farmers who have no

access to credit. In the Philippines it has been possible to extend insurance to a sufficiently large number of non-borrowing farmers. However, if insurance is entirely on a voluntary basis and only selected farmers purchase it, the problems of anti-selection and high delivery and servicing costs are likely to be encountered. In the case of the Philippines, the loss ratio of non-borrowing farmers is considerably higher at 127 per cent than for borrowing farmers for whom it is 85 per cent. The possibility of enrolling small marginal farmers as members of a society or an association or a cooperative and providing insurance through such an organization could be explored. This will then form a similar group as in the case of insurance provided in conjunction with credit.

(g) Reinsurance

97. For schemes which have a high social welfare component and are not demonstrably commercially viable, international reinsurance support is unlikely to be forthcoming. The argument that international reinsurers should support the socially-oriented schemes regardless of their non-viability in view of the profits made from other lines of business does not carry weight. However, the reinsurance market might be interested in a programme with a high franchise as suggested in paragraph 89 above, even though targeted at poor and small farmers. This is because a catastrophe that is severe enough for the high franchise to be reached occurs only once in a while, and a commercial judgement can be made. The reinsurer would still like to be satisfied that the premium rate has been set properly and that the loss assessment system is effective.

2. Semi-commercial and emerging sector

(a) Insurance on an evolutionary basis

98. Provision of insurance to this sector has to be evolutionary. To begin with, small schemes covering a small area, a specific line of activity or a simple production process can be taken up and designated as on a "pilot" basis so that subsequent modifications are easy to make. The desired spread should be accomplished by having a large number of schemes well dispersed geographically. This would also avoid the problem of accumulation of risks.

(b) Insurance on a group basis

99. Because of the small size of farmers' operations, the sale and servicing of insurance to them individually may still be difficult. Offering insurance entirely on a voluntary basis may also lead to problems of anti-selection. As a possible solution, farmers could be placed in groups of risk categories according to some criteria such as production techniques employed, previous credit history, assets and land holdings, access to irrigation, etc. In New Zealand more than 4,600 kiwi fruit growers have been insured through a Master Policy issued to their Marketing Board, but the indemnity is reduced for the grower with a bad claims experience. 38/ The area is sufficiently large to prevent excessive co-variability problems.

(c) Insurance through cooperatives

100. There is a natural synergy between insurance and cooperative activities, and the cooperatives can be a natural bridge between farmers and the insurance companies. Many cooperatives are anchored in rural areas and are more responsive to local needs. A network of cooperatives in different fields such as livestock, fisheries, agricultural production, marketing, and transport can reach rural areas more readily and become focal points for insurance servicing. A large number of cooperative societies already exist, and insurance can be added to their other activities. They can act as intermediaries placing business with insurers. In Zambia the apex Agricultural Co-operative (and the Lima Bank) are agents of the Zambia State Insurance Corporation. A 10 per cent "Administrative Discount" is given, for which consideration they identify groups to be insured, list the farmers in these groups, and calculate sums insured. They also carry out random crop inspections and compile data on the actual yield achieved at the end of the season for the purpose of claim settlement.

(d) Consortium of private companies

101. The insurance of this sector should be increasingly taken up by private sector companies. However, insurance companies in developing countries are of different sizes, a large number of them being small with limited capital funds. It may not be possible for them to take an initiative in agricultural insurance to any significant extent, unless one of them decides to specialize in the line. The logical answer will be for the leading companies to take the first steps. However, for the insurance company starting in agricultural insurance there would be a substantial investment in developing insurance awareness and in creating a network on which other companies might then "free ride". This could well make a company reluctant to take meaningful and effective steps and be the first to move. A consortium arrangement might therefore be useful.

(e) Limitations of planning

102. The needs of farmers should be carefully identified when products and operational strategies are formulated. Advance planning is necessary. However, it is not possible to create an "ideal" model. No amount of planning will enable a "perfect" scheme to be formulated from the beginning. Revisions and adjustments can be made based on experience. It has been observed that: "It is important to note that a sound system of insurance can be built up only on the foundation of accumulated experience from its actual operation. No amount of advance work, however important it may be for initiating a crop insurance programme, can secure a level of perfection". 39/

(f) Initial schemes

103. It is prudent to start with lines of business that are easy to transact in terms of design and loss assessment. It is also advisable to limit the scope of the cover to named perils, so that the problems associated with all-risk and yield-based insurance protection can be avoided. If a single peril such as fire or hail does not meet the demands of the market, selected

additional perils may be added, but each one cautiously, after due consideration. If certain allied perils show the same loss symptom, the cover could be extended to these because it would be difficult to distinguish which losses are attributable to each of the perils. For example, when flood has been covered, risks of inundation, waterlogging and specified diseases consequent to high humidity can be added, depending upon the terrain, without a substantial additional premium. It may also be advisable to provide indemnity on the basis of input costs rather than fall in yield.

(g) Rating and underwriting on a group basis

104. In view of the recommended group approach for delivery of insurance, a rating pattern based on area or group experience may have to be adopted. Complete historical data are unlikely to be available, and a strict actuarial calculation of premiums may not be possible. A beginning, however, can be made by rating on a comparative basis, as is done in many instances of property insurance. Here again, too fine a distinction may not be necessary or worthwhile, and a broad category of risk classification and rating may suffice, as in the case of many industrial risks rated on the principle of broad banding.

105. It may not yet be possible to underwrite risks on an individual basis and pre-acceptance surveys could be difficult. Risks are too small for such an exercise. If there is a sufficiently large number of more or less similar risks, authority may be given to lower formations of the organization to accept risks if they fall within an established underwriting policy. This is the practice in the case of motor insurance. A much stricter approach would be necessary for assessment of loss. "Individual approach" in settlement of claims could be introduced. However, flexibility will have to be maintained. When a large number of similarly affected risks have suffered a loss or damage and inter se differences are likely to be marginal, all claims could be treated similarly.

(h) Collection of statistics

106. Emphasis must be laid from the beginning on proper collection and collation of data at the operational level. Meaningful advances in the long run can only be made with strong statistical support. This has necessarily to be centralized. The cost of information technology has now come down to affordable levels and its utilization should be considered for compiling statistics, and keeping them updated, on the basis of returns filed. The expenditure will be justified in terms of improved underwriting and settlement of losses. Alternatively, the job can be entrusted to an agency, or a statistical institute or a university that has the necessary facilities. In the United States of America, many crop insurers have formed the National Association of Crop Insurance Services, which is a service organization to collect and analyse data on various crops across the country. 40/

(i) Franchise and deductibles

107. Incorporating a reasonable franchise and/or deductible would be worthwhile. This will ensure that sufficient efforts are made to minimize the loss when it occurs. As the insurer is relieved of very small claims, which none the less are costly to process, the price of insurance will also be less.

(j) Risk management

108. Lastly, but most important of all, the role of insurance as an instrument for promoting risk management practices should be recognized from the outset. This implies that insurance officials should not be content with simply booking business and processing claims, but should take an interest, participate in discussions, and make suggestions in respect of why and how losses have occurred, and what can be done to avert them or reduce their severity. Where programmes are run with the involvement of the State by way of subsidy, the State has a vested interest, and the help of the appropriate authorities can be obtained to inform farmers about loss prevention techniques through extension services, adult education centres, radio and television.

3. Commercial sector

(a) Viability of farming, underwriting

109. The design of insurance in the case of this sector has to be primarily on considerations of economic viability. The crop to be insured, the risks to be covered and the level of indemnity will no doubt differ from one country to another and within a country from one region to another. Generally speaking, cash crops whose production systems have stabilized and which are concentrated in small areas, in contrast to staple crops cultivated by numerous small farmers throughout the region or the country, lend themselves better to insurance on a commercial basis.

110. In the initial stages a few selected crops that are acknowledged to be profitable may be taken up for insurance. The economics of the operations should be closely examined. Often the project data submitted to the bank for obtaining credit provide a good guide.

111. A beginning can be made with a limited cover. The perils could be named, indemnity limited to a percentage of input costs and a reasonable franchise and/or a deductible provided. A limited cover does not mean that only limited benefits would accrue to the farmer; serious losses could still arise which would be within the scope of the cover. For example, hail insurance can be introduced in areas or countries where hailstorms are encountered. Hail insurance is common in developed countries, and proper systems have been evolved. It will also be easier to get reinsurance support for hail insurance.

112. Formulation of detailed and precise underwriting guidelines, and

pre-acceptance surveys of risk go a long way in managing business. A properly designed and adequately answered questionnaire could be an important and cost-effective tool in underwriting risks of this nature. 41/ The exact area of the plot covered, the production cycle and the period of insurance need to be clearly specified.

113. How the enterprise is managed is more important than is commonly realized. Risk management should be practised. The policy in use in Zambia has a "due diligence" clause to promote this.

114. Underwriting should be on an individual basis and the cover should be tailor made to meet the requirements. The rating pattern has to be flexible.

115. Continuity of insurance for a number of years is important. Only on this basis is there a chance for both parties to balance claims and premiums over a time span. 42/

(b) No-claim refund, loading, deductibles

116. It is good policy to provide a no-claim refund and a loading for adverse claims, depending on the workload involved in making the calculations. The approach usually adopted is to increase the premium (according to an announced formula) if claims have been made frequently , but to limit the increase or not to provide any increase at all if a large claim has occurred due to a catastrophe beyond the farmer's control, such as a locust attack or a natural disaster. The farmer should share a part of the loss so that his interest in the cultivation process and in minimizing the extent of loss continues. This can be done by incorporating a suitable deductible or franchise or both. A caveat needs to be made here. Deductibles by themselves may not reduce the extent of field activity of the insurance company since inspection and possibly a survey will still have to be carried out. Thus there may not be appreciable savings in expenses, 43/ but none the less deductibles are useful instruments for claims minimization efforts. It is fruitful to build-in an incentive for the farmers to make a claim only when the loss is clearly likely to exceed the franchise. Processing frivolous claims is a waste of resources.

(c) Coordination with other agencies

117. Coordination with the banking sector can be highly rewarding. Credit institutions can often provide a key to marketing possibilities by sharing non-confidential information about potential clients. The communication and understanding between banks and insurance companies is usually insufficient and needs to be improved. 44/

118. Input suppliers such as fertilizer manufacturing units, or users of the farmers' produce are often a good contact, not only for selling insurance, but also for obtaining information useful for underwriting and for servicing the business. The role played by sugar mills in Mauritius has already been noted. In Zimbabwe the Tobacco Association has played a constructive role. Ginneries, tanneries and food processing plants can be useful sources for establishing contacts with commercially-oriented farmers. Associations of

growers, agricultural research institutes, universities and other similar institutions can be of immense help if properly approached and cultivated.

(d) Other insurance business

119. Many of the insurance policies marketed in urban areas, such as personal accident, insurance of buildings and their contents and of machinery are relevant for this sector, and efforts should be made to extend them.

4. Specialized production systems

(a) Individual underwriting

120. The points made in respect of the commercial sector are applicable here as well. However, further refinement is often required. These units are close in character to an industrial enterprise and should be treated accordingly. The cover will have to be developed individually and separately for each of the units on the basis of their specific requirements.

121. Activities in this sector are characterized by the adoption of superior technology and by high capital intensity. Insurance of well-established production units related to agriculture has been taken up in the last few decades and is expanding rapidly. However, many of these units are new and still do not have insurance, so an innovative approach is necessary.

122. The perils to be insured would call for a discussion with the person concerned. It has been common experience that the insured in such instances is well aware of the potential damage that can be caused by various hazards and, for the sake of economy in premium cost, will be prepared to opt for a limited peril cover. Tea planters in India and Zimbabwe are content with a hail risk policy since they feel that good management can control other risks at less than the premium cost.

(b) Underwriting considerations

123. The profitability of the venture should be examined in detail before designing the cover. Cost of various inputs and overheads and the value of the likely output may be scrutinized. Since the variations can be substantial, insurance should be offered only if the margins are adequate.

124. The technology employed may be undergoing a change, such as adoption of a better variety of seeds as they become available in the country. Hence, in addition to historical data, the current situation and management practices should be examined when negotiating the terms and conditions of insurance. Systems of loss assessment for insurance of cotton in Australia have been periodically adjusted in keeping with technological advances.

125. It is usual to insist on insurance of the whole of the farm and not allow insurance on selected items only, as is the case in property insurance when the insured can opt to insure selected blocks only. It is also usual to stipulate that damage to a section of what has been insured will not be indemnified, since this could be made up by higher production in other sections and only the overall results will determine the indemnity.

126. To avoid misunderstanding and differing interpretations in the eventuality of a claim, the benefits provided by the policy should be clearly explained at the beginning. Unlike property insurance, the practices are not yet well established. Hence there is scope for subsequent arguments.

(c) Other insurance business

127. Units in this sector require substantial investments and this provides a good opportunity for the insurance industry, which traditionally follows wherever investments have been made and assets created. Insurance may be for plants, buildings, machinery and equipment, and stock-in-process, in addition to crops grown. Risks of fire and allied perils, theft and robbery can be covered. There would also be scope for providing what may be described as auxiliary insurance covers such as personal accident and medical benefits to employees. Liability insurance and insurance for transport of goods and material can also be offered. Product insurance (concerning the responsibility for defects in the products) is by and large not yet in vogue in developing countries. Demand for this may, however, increase in the near future, partly as a consequence of liabilities associated with the export of goods. This will provide the insurance industry with an opportunity to generate new business. A useful role would also have been played in enhancing consumer protection.

(d) Risk management

128. There is also scope for introducing an effective risk management system. Insurers have successfully stipulated specifications for the construction and maintenance of greenhouses as a pre-condition of insurance. Insurance as an input is important, and its denial, or the terms on which it is offered, may be a leverage which should be meaningfully used.

(e) Reinsurance

129. Reinsurance in the international market is possible for insurance covers given to this sector. This facility should be utilized, since the business would be new and exposure can be substantial. The help of reinsurers, brokers and international consultants and advisers with their worldwide experience can also be of benefit in working out details of the cover. Various issues relating to reinsurance are discussed in chapter IX.

G. General observations

130. In this section a few issues are discussed which, although primarily related to crop insurance, in fact concern the entire field of agricultural insurance.

1. Private versus public sector insurance

131. As in other areas, the role of private sector insurance companies and parastatal organizations in the insurance industry is often discussed. It is necessary to bear in mind the historical perspective. A decade or two earlier, national insurance markets were not yet established in most

developing countries, and private insurance companies were, by and large, young and small, and had little urge or capacity to explore new areas. Under these circumstances, the spread of insurance services in the rural areas was minimal. The benefits of extending such services to a wider section of the community were recognized by the policy makers. There was also a realization that the agricultural sector requires financial support, and that insurance is an integral part of financial services. With this background, many parastatal institutions were set up and national insurance companies were also required to initiate schemes of agricultural insurance. They fulfilled a requirement which otherwise would not have been met. As can be expected, there have been both successes and failures. Experience has been gained and lessons have been learned. It would, therefore, be inappropriate to underestimate the value of the initiatives taken by parastatal bodies. At the same time, the domestic economic policies are being reassessed in most countries. It is clear that the trend towards liberalization is inevitable and irreversible even though the process varies greatly in speed and extent from country to country. In particular, the private sector is receiving a great deal of attention. This has to be fitted in with the national priorities and the legislative framework. In this connection, it may be mentioned that according to the answers given to the UNCTAD secretariat questionnaire, out of the 25 countries that reported offering specific insurance for crops, the scheme is managed by a State- or semi-State-owned organization in 14 of them, exclusively by private companies in 8 countries, and by a pool of insurance companies in 2 countries. One country did not respond to the specific question pertaining to the management of the scheme. Five countries reported that insurance is offered both by State-owned and private companies.

132. As far as agricultural insurance is concerned, the time has come for private insurance companies to take a greater interest than they have been able to do so far. They clearly have an increasing, and important, role to play. Wherever opportunity has been given, they have done well, as in Mexico and Venezuela. The commercially oriented and specialized production systems (including poultry farming and aquaculture) are the obvious areas where private companies can take meaningful initiatives. The facility of individual underwriting is available here and often significant investment is involved. The scope of cover can be decided on merit. As a general rule, the narrower the cover the greater the possibility of precision in pricing. It will also enable better assessment of claims and produce more stable results. The business can be developed cautiously and in a manner to ensure that there is a reasonable chance of profit. Private insurance companies would have the operational flexibility to deal with the needs of this sector and to evolve or modify product design to meet the demands of the customers. In the worst situation, even if a profit is not made initially, at least substantial losses would be avoided.

133. It is doubtful whether private companies would find it convenient to take up schemes meant for traditional and small farmers. However, if they are willing to take up the challenge, possibly on a consortium basis, this should be encouraged, particularly in countries where agricultural insurance is either not expanding or is incurring heavy losses under parastatal organizations. With private sector companies coming in, the market will open up and greater innovativeness will be displayed. With this in mind, the

legislative framework may have to be modified in cases where agricultural insurance has so far been restricted to parastatal bodies. Furthermore, a level playing field will have to be provided; the facilities available to parastatal bodies should also be extended to private companies.

134. In advocating a more active role for private companies in agricultural insurance in developing countries, note has to be taken of their usually small capital base. It may not be easy for them to raise additional capital for the purpose, in view of the uncertainties involved. Reinsurance support, on which they have to depend more heavily than parastatal institutions, is also not always available for new schemes or the conditions imposed by the reinsurers are onerous. Private companies, therefore, are often unable to maintain continuity of terms and conditions and of service. This causes serious setbacks in the development of agricultural insurance.

135. The parastatal bodies engaged in agricultural insurance, on the other hand, can afford to take a longer view and have a greater staying power even if losses are incurred for a few years. Furthermore, they have built up some infrastructure and expertise, and have the advantage of having established the requisite connection with agencies concerned with the agricultural sector. By and large they also have the necessary motivation. Given the limitations under which they function they have done well and need not be on the defensive; at the same time, they have to realize that they cannot continue forever to have the exclusive patronage of the government if the goods are not delivered. They must, therefore, continue and in fact accelerate their efforts to make their schemes more effective, and to extend the scope of these. In particular, they should find ways and means of moving away from massive subsidy regimes. A twin-track approach has to be adopted. First, ways and means have to be found for reducing, over a period, the subsidy element in the existing schemes. This may require modifications in the schemes. It is true that this is not always easy, since farmers in many instances have come to regard the subsidy as their right. Politicians often champion their cause. Second, there has to be greater dynamism than has been the case so far in developing commercially oriented and viable schemes.

136. There is a clear need for "commercialization" of the operations of parastatal bodies involved in agricultural insurance. Who owns the share capital of the organization is not as important as how the activities are conducted. If parastatal bodies can reorient their operations so that financial discipline and accountability, and commercial justifiability of their schemes (with or without State aid) are ensured, much of the criticism against them would be invalidated.

2. Subsidy for agricultural insurance

137. The provision of a subsidy, or support, by the State to agricultural insurance, particularly crop insurance, is a recurrent point of argument. A general objection to subsidies may not be tenable. Subsidies are an accepted instrument of State intervention and are common in many other spheres. As far as agriculture is concerned, State support is extended in various forms - supply of inputs, infrastructural facilities, transport and marketing, and price guarantee or direct price subsidy. What is relevant is that there

should be transparency in the purpose of the subsidy, its extent and the manner in which it is given. 45/

138. State support to agricultural insurance can broadly be for three purposes. First, since the administrative costs are high, the State may consider funding a part of expenses, particularly in the early stages of the programme as the start-up support. This should be realistically estimated and agreed upon. Second, the State may take a conscious decision to pay a part of the premium on behalf of the section of farmers considered vulnerable or for cultivation of crops it wishes to encourage. In view of the limited budgetary resources of governments in developing countries, this should be generally limited to subsistence or traditional farmers, and small and emerging farmers. However, the actual and economic premium required to provide the insurance should be first realistically determined and then only the extent of the subsidy should be fixed. From the insurance point of view, what is important is that the economic premium is paid either by the farmer or someone else on his behalf. With the agreed subsidy, the implementing agency should be self-sufficient and made accountable. State intervention should not take the form of prevailing upon the implementing agency to agree to an unrealistic rate and then funding the deficit, whatever this may be. In other words, the subsidy should be ex-ante and not ex-post. 46/ Third, the State may have to come to the rescue to a further extent in an exceptionally bad year when a major catastrophe has struck and the losses have exceeded all estimates. Such support is best provided through the mechanism of reinsurance. This aspect is further discussed in paragraphs 380-384.

139. Generally speaking, the financial support of the State to agricultural insurance should be so planned that it does not become a locked-in commitment and is possible to reduce or phase it out in the course of time, as the insurance sector gains strength and is able to assume greater responsibility. For this purpose, it will be advisible to indicate the plan of phased withdrawal right from the beginning since such a proposal becomes difficult to introduce later on.

3. Insurance and State catastrophe relief

140. In a number of countries/territories the State provides aid or relief to, amongst others, farmers affected by natural catastrophe. The following developing countries and territories have programmes of this nature, either on a regular or ad hoc basis: China, Colombia, Costa Rica, Guadaloupe, India, Islamic Republic of Iran, Israel, Malaysia, Mongolia, Nigeria, Pakistan, the Philippines, Sri Lanka, Thailand, Tunisia, the Windward Islands and Zimbabwe. The following developed countries and economies in transition also have publicly funded relief or aid programmes: Australia, France, Finland, Greece, Hungary, Japan, New Zealand, Poland, Russian Federation, Switzerland, Sweden, the United Kingdom, and the United States of America.

141. Compensation for losses suffered is also provided by insurance, and the interface between indemnity received from insurance on one hand and catastrophe relief provided by the State on the other requires consideration. In Cyprus the system of public catastrophe relief for crops has been given up in favour of crop insurance. In New Zealand there is a trend to reduce State

assistance given for agricultural disasters since it is believed that the insurance sector should take care of the losses sustained.

142. In developing countries, however, public catastrophic relief programmes may still be necessary side by side with agricultural insurance, despite the various administrative and other deficiencies from which they may suffer. For various reasons, the insurance system has not as yet developed to the extent of being able to take sufficient care of losses suffered when a catastrophe strikes. Insurance may not cover all the crops or may not be comprehensive enough. More importantly, its spread may be limited.

143. At the same time, insurance is an efficient and more professional way of providing compensation, and the quantification of the extent of damage suffered is more accurate. It is necessary therefore that the programme of public relief for catastrophe should not operate in a manner which discourages farmers from taking out insurance. The two should be properly integrated, and their respective roles defined. 47/

144. The extent of overlap will depend upon the frequency of catastrophe relief, and operational details such as whether the amount of relief is for the full extent of loss suffered or only a small portion (in the nature of a rehabilitation grant), whether it is limited in terms of types and size of farm operations, and whether there is a cap on the amount paid. Obviously, the overlap would be less if the relief programme is a restricted one. Different approaches can be adopted in respect of the overlap. For example, in Israel the Law for the Compensation of Those Hurt by Natural Disaster specifically provides that the sum which has been paid or is due under an insurance contract shall be deducted from what is payable under the scheme. The Relief Fund for Damaged Agricultural Units established in 1979 in the Islamic Republic of Iran to provide catastrophe aid to affected farmers excludes the products and perils insured by the Agricultural Products Insurance Fund. A further refinement would be to give catastrophe relief only to those who have taken the basic cover, as is the case in France, where compensation is given from the National Guarantee Fund for Agricultural Calamities for around 25 to 28 per cent of the crop damage suffered if the farmer has fire and allied perils insurance on his buildings and premises, and up to 35 per cent if he has hail insurance on his crop, from commercial insurers. 48/ In fact, his application for compensation has to be routed through the commercial insurer. This system is based on the consideration that the farmer should at least have taken the minimum precaution by purchasing the commercially available limited cover.

145. The issue of the overlap needs examination in respect of subsidized and non-subsidized, and voluntary and compulsory insurance schemes. A distinction has also to be made in terms of subsistence farmers, small and emerging farmers, and commercially oriented farmers. There is no direct conflict between insurance and State relief in the case of non-subsidized insurance schemes. Restricting public relief only to those who have taken some form of insurance (on the French pattern or any similar but modified formula) is logical and much can be said in its favour from a conceptual and theoretical point of view. However, such an approach may not be practical in developing countries in view of the fact that in reality the percentage of farmers covered by insurance is small. This is particularly true in respect

of small farmers. It can be argued that the principle by which a person or an enterprise is required to take commercial insurance in order to be eligible for public relief can at least be applied to the larger and commercialized category of farmers. But such a discrimination linked to insurance may be difficult to make in practice, and in any case public relief in developing countries is usually restricted, inter alia due to paucity of resources, to the small farmers. The main justification for deducting the insurance claim amount from the relief to which a person is entitled is that, since the total amount available for relief is limited, it should be utilized for those who need it most. Those who have no other source to turn to (such as insurance) are the most needy and from a public welfare point of view have to be looked after first. However, this would be clearly unfair, and almost penalize those who have taken insurance. Furthermore, since only a small section of farmers is likely to be covered by insurance, not giving relief to them would not produce any substantial savings which could then be used to increase relief to uninsured farmers. It would, therefore, appear that, with the exception of countries where agricultural operations are taken up by a large section of the population on an advanced commercial basis, public relief may be kept independent of non-subsidized and commercially contracted insurance.

146. The interface between public relief and subsidized insurance is more complex. It can be justifiably argued that giving relief to farmers with subsidized insurance represents an inequitable increase in benefit and places undue strain on public finance. Subsidized insurance schemes are usually compulsory. However, often only one or two crops are covered and, for various reasons, the scheme does not always extend to all regions or areas. Relief, in any case, has to be provided to those not covered. Not giving relief to those who have at least paid part of the premium would be inequitable. Furthermore, insurance is likely to have a franchise or deductible, and the relief itself (as normally provided in developing countries) never amounts to the full extent of the damage suffered. It may be added that it is possible that some farmers may somehow or other not have joined, or evaded, a compulsory and subsidized scheme. A case can be made out for denial of relief to these farmers on the ground that they have not fulfilled the obligation of joining the scheme. But it has to be established whether the farmer or the implementing agency was responsible for the omission; in any case, the number of farmers involved is likely to be insignificant. Finally, consideration has also to be given to subsidized but voluntary schemes. Since an element of choice is available, relief to this group of farmers has to be treated slightly differently. They should be encouraged to opt for insurance and avail themselves of the benefit of the subsidy provided. However, they cannot be dealt with more strictly than those under the compulsory scheme. In conclusion, therefore, it would appear that in view of various administrative complications involved in making a distinction between one group of farmers and others, and the over-riding consideration that the reach of insurance is very limited, it might be more practical not to link public relief with insurance schemes even when these are subsidized.

4. Agricultural insurance and environment

147. Agricultural insurance and appropriate practices of risk management can be relevant in environmental protection, though this aspect has not yet been fully explored. Insurance companies in many instances stipulate guidelines for production processes, norms for the storage and transportation of materials, and procedures and standards for the disposal of waste in industrial and commercial sectors. This needs further development and extension to the agricultural sector. Through appropriate Conditions and Warranties, better systems of disposal of waste material, storage of chemicals and pesticides, etc., can be promoted. Similarly, processes that will avoid or minimize chemical residue and contamination of food products can be encouraged. Insurance for ecological disasters, such as contamination of water tables and oil and chemical spills, are available in developed countries, and can be gradually introduced in developing countries. As systems of legal liability for environmental damage are gradually established, consideration can be given to the possibility of restricting insurance to processes that do not contribute directly to environmental degradation. Furthermore, according to present thinking, a crop's natural defence system should be encouraged, and crop protection products applied selectively and only after the damage done by pests truly becomes a problem. Adoption of such a system of "integrated pest management" carries a risk, and insurance can be of help. 49/ An effort being made in Germany, although not of immediate relevance to the conditions in developing countries, is interesting to note. Insurance is being proposed for the risk the farmer faces when he rents his land for environmentally friendly recycling of waste material. 50/

5. Insurance and cost of production

148. In many countries the prices of the main agricultural products are fixed by the appropriate authorities as the floor price or the price for their procurement programmes (which are then sold through distribution channels, or stored for leaner years). The cost of insurance is normally not regarded as a part of the production cost structure when pricing is decided. Obviously this is not justifiable. Insurance is a normal feature of industrial production costing, and there is little justification in not extending the benefit to agricultural production. Insurance should, therefore, be recognized as a legitimate cost of production and reflected in the determination of the pricing.

6. Liberalization and agricultural insurance

149. The Uruguay Round of GATT negotiations has still to be concluded, but the provisions in respect of the proposed Agreement on Agriculture relating to insurance may be noted. Exemption can be claimed from commitments to reduce domestic support measures in favour of agricultural producers in respect of publicly funded support programmes provided that they have no, or at most minimal, trade distortion effects or effects on production. The following two policy-specific criteria and conditions are stipulated. First, in respect of a government's financial participation in income insurance and income safety-net programmes:

(i) Eligibility for such payments shall be determined by an income loss, taking into account only income derived from agriculture, which exceeds 30 per cent of average gross income or the equivalent in net income terms (excluding any payments from the same or similar schemes) in the preceding three-year period or a three-year average based on the preceding five-year period, excluding the highest and the lowest entry.

(ii) The amount of such payments shall compensate for less than 70 per cent of the producer's income loss in the year the producer becomes eligible to receive this assistance.

(iii) The amount of any such payments shall relate solely to income; it shall not relate to the type of volume of production (including livestock units) undertaken by the producer; or to the prices, domestic or international, applying to such production; or to the factors of production employed.

(iv) Where a producer receives in the same year payments under this and the following conditions, the total of such payments shall be less than 100 per cent of the producer's total income loss.

150. Second, for payments (made either directly or by way of government financial participation in crop insurance schemes) for relief from natural disasters:

(i) Eligibility for such payments shall arise only following a formal recognition by government authorities that a natural or like disaster (including disease outbreaks, pest infestations, nuclear accidents, and war on the territory of the participant concerned) has occurred or is occurring; and shall be determined by a production loss which exceeds 30 per cent of the average of production in the preceding three-year period or a three year average based on the preceding five-year period, excluding the highest and the lowest entry.

(ii) Payments made following a disaster shall be applied only in respect of losses of income, livestock (including payments in connection with the veterinary treatment of animals), land or other production factors due to the natural disaster in question.

(iii) Payments shall compensate for not more than the total cost of replacing such losses and shall not require or specify the type or quantity of future production.

(iv) Payments made during a disaster shall not exceed the level required to prevent or alleviate further loss as defined in criterion (ii) above.

(v) Where a producer receives the same year payments ... (income insurance and income safety-net programmes), the total of such payments shall be less than 100 per cent of the producer's total income loss.

151. It is also provided that the least developed countries shall be exempt from these reduction commitments.51/

152. The International Monetary Fund and the World Bank are known to look at the budgets of governments when granting assistance, and are presumed to require a reduction in the national budget deficits. This may entail reduction in various subsidies given by the State. Each case of assistance is negotiated separately depending upon specificities of the situation. As far as agricultural insurance programmes are concerned, there are no specific guidelines, and the view taken by these organizations will depend upon how such programmes are managed and how effective they are deemed to be.

7. Foreign insurance companies

153. Foreign reinsurance companies and institutions are participating in and, in fact, supporting agricultural insurance in many developing countries. Various aspects of these activities are discussed in chapter IX. However, the role of foreign insurance companies registered to do direct business in a developing country needs to be established in respect of agricultural insurance schemes. Foreign insurance companies are operating in many countries. It is true that they may not be able to play an effective role in agricultural insurance because of unfamiliarity with the rural environment. At the same time, it would not be fair to domestic companies to absolve the foreign companies of all responsibilities. It should, therefore, be considered whether foreign registered insurers should not be required to participate in agricultural insurance schemes by taking a share or supporting the effort through reinsurance by the local branch. Some markets are closed to foreign insurance companies, either because they are nationalized markets or because in practice no new licence is being given as the market is considered to be saturated. It is a moot question whether and on what conditions foreign insurers would be allowed entry into developing country markets in the years to come, as a result of the process of liberalization in services being considered in the Uruguay Round. In any case, it is for governments to consider whether preference can be given, within the framework of their national policies, to international insurance organizations willing to develop agricultural insurance in a developing country, either on their own or in collaboration with a local company.

8. Compensatory financing

154. The variations in the quantities of exported agricultural products are one of the rationales behind commodity-related compensatory financing schemes for the benefit of developing countries, such as the STABEX facilities of the ACP-EEC Lomé Convention. When a developing country receives transfers under such a facility, it is obliged to specify the use that will be made of the monies, more particularly in the sector suffering the loss of earnings. Past uses have included road repairs, writing off bad loans of farmers and improving fertilizer supplies. It appears useful to consider whether some of the funds could be used to reach farmers through agricultural insurance programmes, particularly when the cause of the drop in earnings is related to production problems. This would require the existence of insurance programmes in the relevant sectors and the willingness of governments to propose channelling some of the funds to them. 52/

9. Futures market for commodities

155. This study is concerned with what is traditionally considered as the business of the insurance industry. However, there are other institutions that diversify risks for the different economic agents and serve the purpose of insurance, though not in the sense in which the term is generally used. The reference here is to the futures market for commodities. The producers, processors and traders are exposed to the risks of price fluctuations, *inter alia*, as a result of production variations. For example, a producer may not be able to cover his production costs if prices fall, or a trader may have to buy from the open market to keep his commitment if the producer he had contracted with is unable to supply. Commodity exchanges and over-the-counter markets exist in developing economies where it is possible to hedge through a futures contract, forward contract or option. 53/ The opportunity should not be lost of promoting or strengthening local exchanges for the main commodities wherever possible.

Chapter III

LIVESTOCK INSURANCE

Introduction

156. Livestock has been defined as animals kept or raised for use or pleasure. Pets and horses for racing and sports constitute a sizeable number in the developed world, but this is not the case in developing countries and our discussion is confined to animals meant for economic use. In some countries certain animals (such as rabbits, chinchillas and minks) are reared for their skin or fur. These are specialities and insurance for them will have to be specially devised. Poultry, and aquaculture (fish rearing, other than cultivation of aquatic plants) are a part of livestock by definition, but since their insurance issues are specific, they will be treated in separate chapters. The discussion which follows is confined to bovine and other four-legged animals raised for food, wool or to provide draught power.

157. Livestock food products, namely meat and dairy products, are an important source of nutrition. For food importing countries, valuable foreign exchange can be saved which otherwise would be required for imports of meat and dairy products. Many other developing countries export sizeable volumes of meat and dairy products. Some countries export live animals. The advantages of livestock production are particularly strong since the animals are herbivorous, and it is possible to convert residual and downstream vegetable-based products, such as forage, cake left over after extraction of oil from various seeds, etc., into high-quality protein.

158. From the farmer's point of view, there are numerous benefits from rearing livestock. In view of the insufficient mechanization in the rural areas, livestock provides a good source of draught power, both for cultivation and transport. Dairy products, meat, hide, wool and fur of certain animals are also valuable. Livestock thus provides an alternative source of income and sustenance, reducing dependence on crop production. A large number of farmers are likely to have some livestock in addition to growing crops. Investment in animals is often a large part of the farmer's total capital, and this investment needs to be protected. Hence, livestock insurance is an important element of agricultural insurance in developing countries for the small and traditional farmers, as well as for the commercialized sector.

159. Procurement of the animal is often financed through credit. Insurance as a security for credit has a developmental role at the micro-level by improving the creditworthiness of the farmer, and at the macro-level by making for a greater flow of credit to this vital sector. In many countries insurance policies are not acceptable as primary security, but could be of great benefit to the lending institution as supplementary security. Foreclosure of the basic security, say, mortgage of land, is likely to be time consuming, whereas payment of the claim by the insurance company would be more readily forthcoming. Dialogue and negotiations with the banking

sector should, therefore, be taken up more perseveringly wherever banks have not agreed to support the credit with livestock insurance. In response to the UNCTAD secretariat questionnaire, out of the 28 countries which reported having livestock insurance, banks or financing institutions require the farmers to have insurance in 15 countries or 54 per cent.

160. Livestock insurance also has a risk management role. As will be discussed later, insistence on minimum health standards and adequate animal husbandry practices, including regular vaccination of the animal against the major diseases, is an integral part of a livestock insurance programme. This leads to an improvement in epizootiological conditions. According to the answers to the UNCTAD secretariat questionnaire, 25 countries reported having health standards and practices for the animals insured and, of these, 11 required a health certificate and a regular check-up, 7 a health certificate only and 4 a regular check-up.

161. The significance of livestock insurance is accentuated by the fact that, in most of the developing countries, efforts are being made to improve the genetic quality of indigenous animals by importing animals of high-yielding foreign breeds, particularly breeders. The imported animal is a high risk since it may not readily adapt to the new environment and climate, but the offspring generally do so. Insurance of the imported animals will smooth the transition to improved breeds and thus the attainment of higher productivity. It is to be noted, however, that insurance of imported animals only is anti-selection against the insurance company and could lead to the collapse of the livestock insurance scheme. Insurance of imported animals should therefore be provided together with that of domestic animals.

A. Spread of livestock insurance

162. Livestock insurance is perhaps one of the earliest forms of insurance. Some form of it is believed to have been in practice in Babylon. 54/ In several countries in Europe the insurance of livestock has been undertaken on a mutual basis for over 700 years. 55/

163. A large number of developing countries have systems of livestock insurance. Out of 44 countries that provided information in response to the UNCTAD questionnaire, 28 or 64 per cent reported having livestock insurance. This is despite the fact that epizootiological practices vary and in many instances are below the standards acceptable in developed countries. The higher risk factor has been taken care of by such means as restricting the cover, charging higher rates, being more selective in acceptance, and tightening the loss assessment system.

164. In some countries livestock insurance already contributes appreciably to the total premium volume, being 5 per cent in China and 6 per cent in Algeria. In India nearly 18.2 million animals were insured in 1988-1989. However, the premium derived was only 3.9 per cent of the total because of the concessional premium rate for "scheme" animals (those financed at concessional interest rates, available to individuals below a defined low-income level, under one of the several poverty alleviation programmes). Nevertheless, it is a notable effort since, although the livestock population

of the country is very large, the bulk of it is of little economic use and hence uninsurable.

165. The plan of this chapter is as follows. First, the design of livestock insurance is discussed in terms of practices in Ethiopia, India, Kenya, Pakistan, the Philippines, Sri Lanka and Zambia (single animal scheme). There are variations among the different schemes, but a comparison is still possible. Links with other institutions, administration, insurance of animals other than cattle, and insurance for transportation of livestock are then discussed. Lastly, some general observations are made on livestock insurance in developing countries.

B. Design of livestock insurance

166. Schemes of livestock insurance have not been designed on the basis of the four sectors of agriculture indicated in an earlier chapter. It is therefore not possible to discuss the various aspects of design separately for each of the sectors. However, wherever relevant and possible, the characteristics of the four sectors are indicated.

167. At the outset it may be stated that livestock insurance in developing countries covers the risk of death due to accident or disease (on observance of stipulated conditions and with certain exceptions). In some cases it extends to death due to surgical operations, breeding and parturition (pathological conditions associated with the reproductive process of the animal), and permanent total disability (incapacity to conceive or yield milk in the case of dairy cattle and in male animals to breed). However, it does not cover variations in production efficiency, or income or consequential losses. The variables which determine the features of a livestock insurance scheme are: geographical location, species (and breed), mortality, age (or life-span within which insurance is offered), perils covered, sum insured, premium rates, and livestock management strategy.

1. Geographical location

168. The geographical location of the country or the location of the area in which the insured animals are concentrated, will have an influence on the characteristics of the insurance scheme. Animal husbandry facilities and the quality of feed available can vary, and agro-climatic conditions will have an effect on disease incidence and mortality. Similarly, the extent of the spread of risks achieved (or likely to be achieved) will have an influence. In practice, however, these distinctions are difficult to determine precisely before the commencement of a scheme and unfold only in the course of time.

2. Species and breed

169. Of the various species of livestock, cattle are prominent in a large number of countries from the insurance point of view. There are two reasons for this. First, the share of cattle in the animal population is substantial; secondly, they are economically more important as well as more valuable. In fact, in most of the developing countries, insurance models have been first devised for cattle and then extended with the necessary modifications to other animals such as pigs, goats, sheep, horses, ponies,

mules, donkeys, camels, elephants, yaks and deer. Our discussion will therefore deal with cattle.

170. The term cattle is used for domesticated members of the genus Bos and consists mainly of two distinct species of the Bovidae family classified as *Bos indicus* (cow, ox) and *Bos bubalus* (buffalo). Both have different characteristics and do not interbreed. Cows are found all over the world, while buffaloes are found in a few countries only: Bangladesh, China, India, Pakistan, the Philippines and Thailand. Breeds are relatively homogeneous groups of animals within a species and are differentiated on the basis of characteristic body features. These are developed through the process of selection and controlled breeding. Generally, breeds are purpose specific and, in the case of cattle, can be broadly classified into meat, dairy, draught and dual purpose breeds. Thus cattle themselves are not a homogeneous group; the sex of the animal, the purpose for which it is raised and inter alia, the breed have a bearing on insurance design. Cattle may be classified into: calves, heifers, cows and female buffalo for milk, bulls and male buffalo for breeding, bullocks or oxen (castrated bulls), and animals of both sexes for fattening (meat).

171. The introduction of imported foreign breeds, particularly the European high-milk-producing breeds such as Holstein Friesian, Jersey, Red Dane, Brown Swiss, Guernsey, Ayrshire, German Flee Vieh, Shorthorns, etc. for breeding purposes is now common in most developing countries. These are described as exotic when both parents are of a foreign breed, and as cross-bred when one of the parents is of foreign origin. Exotic breed and cross-bred animals are more susceptible to diseases because of an inbuilt (genetic in origin) poor defence mechanism (cattle breeds from Asian countries are imported by European countries to improve the disease resistance system of their animals) and are also affected by environmental factors. Thus, the probability of mortality is high and they attract a higher premium rate. Further, their value is high in comparison with that of indigenous breeds. The insurance of these high-value animals, in fact, has been the beginning of many schemes. For example, the livestock insurance scheme in Sri Lanka commenced in 1975 to provide insurance for the imported high-value animals under an aid programme for dairy development in the country. In practice, it may not always be necessary to adhere strictly to the above distinction, and in many countries animals of various types are often grouped together for the sake of simplicity and easy underwriting by the field personnel responsible for implementation.

3. Mortality

172. In designing insurance for livestock, an estimate of life expectancy and incidence of disease would be useful. However, mortality tables for livestock indicating likely deaths at various ages due to insured perils have not been built up in developing countries. Data available from the government departments are far from comprehensive. The experience of a neighbouring country, or one with a similar agro-climatic zone, is often utilized.

4. Age

173. The productive life of an animal begins from the age of sexual maturity which is mainly dependent on the genetic makeup of the animal but is also influenced to a great extent by environmental factors. The nutrition provided to the animal during infancy and climatic temperature are the two most vital environmental factors. The average age at the beginning of the productive life of the animals in a particular country is generally fixed as the lower limit of the insurable age. Cross-breeding of indigenous bovine breeds with high-yielding exotic breeds, particularly from the temperate climatic zones of America, Australia and Europe, has not only improved the milk production of cross-bred animals but has also reduced the age of sexual maturity and in turn the age of first calving. Insurance cover for cross-bred and exotic animals therefore is sought at an earlier age than indigenous animals. This is particularly so in tropical countries, and account has been taken of this specific requirement in fixing the minimum insurable age. Efforts at restricted scale have also been initiated to provide cover to animals before attaining their productive life. In India insurance cover is available from the age of 4 months, while in the Philippines and Zambia it is available from the ages of 7 months and 6 months respectively.

174. The following classification of animals and age eligibility is used in some of the countries: Ethiopia: 2½ years to 8 years, but insurance is available only for a group of a minimum of 50 animals, since the Agricultural and Industrial Development Bank restricts credit to a minimum of 50 animals for operational reasons and owing to the appraisal costs involved. Most of the animals insured are oxen. India: dairy cows 2 (or earlier age at first calving) to 10 years, dairy buffalo 3 (or earlier age at first calving) to 12 years, stud bulls 2 (or earlier age at sexual maturity) to 8 years, bullocks and male buffalo 2 to 12 years, and calves and heifers 4 months to 32 months (this cover is granted restrictively). Kenya: dairy cattle 2 to 8 years and breeding bulls 1½ years to 8 years. Pakistan: dairy cows 3 (or age at first calving) to 10 years, dairy buffalo 3 (or age at first calving) to 12 years, stud bulls and male buffalo 3 (or earlier age at sexual maturity) to 10 years; bullocks 2 to 8 years. The same ages apply to cross-bred or exotic animals. Philippines: cows and buffalo 7 months to 12 years. Sri Lanka: dairy cows 2 to 12 years and dairy buffalo 4 to 14 years, stud bulls 2 to 8 years and stud buffalo 3 to 8 years, draught bulls 3 to 8 years and draught and ploughing buffalo 3 to 10 years. Zambia: cattle, oxen and high-priced imported animals 6 months to 8 years.

5. Perils

175. The perils insured are essentially death of the animal caused by accident or disease. An accident, for the purpose of livestock insurance, can be viewed as an unexpected and unintended event causing the death of the animal by violent, accidental, external and visible means. Accidents would include fire, lightning, flood, storm, cyclone, riot and strike (natural catastrophe and riot and strike are excluded in the Philippines but can be covered by payment of an additional premium for groups of 14 or more, or for high-value animals), electrocution, snake bite, wildlife attack, strangulation, food poisoning and calving hazards. Death due to surgical operations other than when required by an accident or disease is excluded in

Pakistan but is covered in other schemes cited. A noteworthy feature is that famine is covered in India, but excluded in Ethiopia and Pakistan. Drought is also excluded in Ethiopia. Emergency slaughter or destruction of the animal necessary to terminate incurable suffering on humane considerations, or when the disease is likely to be harmful to human beings, is normally covered on certification by a veterinarian. Slaughter of the animal by order of the government authorities is specifically excluded in the Philippines but in the absence of a specific exclusion is presumed to be covered in other countries. This hardly ever takes place in developing countries.

176. Practices differ in respect of diseases that could be the cause of death covered by the insurance. From the conventional point of view, diseases that are epidemic in nature should not be insured unless an adequate disease control system exists. On the other hand, if they are excluded the insurance will not be meaningful from the insured's point of view. In Kenya all diseases are covered. In most of the other countries also all diseases are covered with the provision that, in the case of certain diseases, namely rinderpest, black quarter (blackleg), haemorrhagic septicaemia (pasteurellosis), anthrax, bovine contagious pleuropneumonia, and foot and mouth disease, the animal must have been successfully vaccinated. This is a good solution worked out by the insurance industry and promotes risk control and improved management.

177. In the Philippines, rinderpest, anthrax, Johne's disease, blackleg, haemorrhagic septicaemia and foot and mouth disease are normally excluded but the two latter can be covered for a group of 14 or more animals or for high-value animals on payment of an additional premium. In India pleuropneumonia is excluded in two districts in a north-eastern state. Diseases contracted prior to insurance are also excluded. Sometimes a waiting period is required. In Kenya it is 30 days and 90 days in the Philippines. In Zambia it is 21 days, except for imported foreign-bred animals, for which it is 90 days.

178. Permanent total disability is included in Sri Lanka with an indemnity of up to 90 per cent of the cover; if, however, it is decided to destroy the animal the indemnity is 50 per cent. Permanent total disability can be covered in India up to 75 per cent of the sum insured on payment of extra premium. It is excluded in Kenya, Pakistan, the Philippines and Zambia. In Ethiopia it is covered only if occasioned by fire or lightning. Wilful or malicious injury or gross negligence, improper use, overloading, unskilful treatment or use of the animal for purposes other than stated in the policy are also normally excluded. Transport by sea or air is also excluded and has to be specifically covered by a separate policy. In some countries a limit is put on movement of the animal beyond about 50 kilometres. Since the risk of death only is covered, loss of an animal due to theft and clandestine sale has been excluded in India. Livestock policies are also subject to other exclusions normal in insurance policies such as war, nuclear risks, etc.

179. In the following section the practices regarding determination of the sum insured, as also the related matter of the basis of indemnity, are discussed.

6. Sum insured

180. The sum insured usually corresponds to the market value of the animal. In many developing countries insurance of animals is closely linked to credit extended by a banking institution. The sum insured, therefore, has to be at least equivalent to the amount of the credit, but could be higher to represent the market value of the animal if the extent of financing is partial. To ensure that the animal is not overvalued at the inception of the insurance (which will lead to moral hazard problems), the valuation normally has to be checked by a veterinarian. This is important, since, as will be discussed subsequently, claims are normally settled on the basis of the sum insured, and not on the basis of the animal's value at the time the loss occurs. To limit exposure and to facilitate acceptance of a large number of risks at the local level, the maximum amounts up to which insurance on different categories of animals will be provided is sometimes stipulated.

181. In Kenya insurance is not linked to credit and no maximum amounts are stipulated up to which cover will be provided. The market value of the animal therefore has to be determined by a veterinarian. There is a deductible of K Sh 750 or 12.5 per cent, whichever is higher, in settlement of claims. In Ethiopia, on the other hand, livestock insurance is completely linked to bank credit. The sum insured conforms to the extent of financing, including interest and charges if payable by the borrower. The bank normally extends credit for the full value of the animal. The credit is for four years and co-terminus insurance for four years is provided at the outset, the premium for the entire period being collected in advance. The sum insured decreases year by year according to the outstanding debt. In India, to determine the sum insured, indemnity and premium, cattle are classified into three categories. First, self-financed private dairies or groups of animals. Second, dairies and cooperatives where bank financing has been obtained. And, third, the "scheme" animals. No upper limits have been stipulated for the sum insured, and for "scheme" animals it corresponds in practice to the extent of bank finance plus the subsidy. For others, it has to be determined or certified by the veterinarian. For insurance of calves, which is granted restrictively and only for breeding programmes sponsored by animal husbandry departments or under a "scheme" programme, specific sums for which insurance is offered are laid down, varying from Rs 150 for a 4-month calf to Rs 2,600 for a 32-month-old calf. This is done to avoid moral hazard risk. In Pakistan no maximum amount for the sum insured has been provided. In practice the banks give loans up to the full value of the animal and this is also the sum insured. The indemnity is limited to 80 per cent of the sum insured. In the Philippines maximum amounts of the sums insured have been fixed at 6,000 pesos or less to 8,000 pesos for individually owned animals (backyard scheme) and 6,000 to 20,000 pesos for high value and commercially-oriented groups of 14 or more animals (commercial scheme). The farmer has the choice of determining the sum insured, but this has to be equal to the extent of the loan taken in cases of bank-financed animals. There is no direct linkage with financing and it has been possible to develop a non-financed portfolio to the extent of about 21 per cent of the total. There is a deductible of 5 per cent of the sum insured or 500 pesos, whichever is lower. In Sri Lanka insurance is provided up to SL Rs 10,000 for dairy cattle and buffalo, stud bulls and buffalo, SL Rs 6,000 for draught bulls and SL Rs 4,000 for draught and plough buffalo, related to the market

value. For financed animals it is equal to the loan. All animals financed are insured, but insurance is also available to others. In fact, the non-financed portfolio is about 25 per cent of the total. In Zambia the sum insured is linked to the market value and the range provided is K 20,000 to K 100,000. Some bulls, especially champion bulls, are insured for amounts up to K 1 million. Most of the financed animals are insured, the sum insured being equal to the credit. The sum insured is on a decreasing basis, and normally runs for four years. It has been possible to develop a non-financed portfolio to the extent of 20 per cent of the total. There is a deductible of 20 per cent.

182. Two issues relating to indemnity need to be noted. The first relates to a possible deduction for the value of the carcass (salvage). In all countries in the sample, except India and Pakistan, provision exists for deduction of salvage from the claim amounts. This is logical. In India, however, it was found that very little, if anything, is realized in reality for the salvage (the majority of the population does not eat cattle or buffalo meat), and the hide has often deteriorated by the time a representative of the insurance company is able to reach the site. With the extent of coverage attained, livestock insurance has reached deep inside the country. The right to salvage and any deduction in the claim amount has, therefore, been abandoned for the sake of speeding up settlement of claims. In Pakistan it is stipulated that no deduction will be made from the claim amount for the salvage, but that the latter will belong to the insurance company. The insurance company is able to dispose of it at a better price.

183. The second issue relates to the possible revision of the sum insured at renewals so that it corresponds to the changing market value or the outstanding bank debt. The value of a milk animal is not constant, but is dependent on variable factors such as the stage of the reproduction cycle, stage of the lactation cycle, milk yield and age. On the other hand, the bank debt decreases progressively according to the repayment schedule. Conceptually, there would be a moral hazard problem if there are substantial variations in the sum insured, the current market value and the bank debt. However, revision of the sum insured is administratively costly, and in the schemes cited (except in Ethiopia) in practice the sum is allowed to remain as determined at the start. A related matter is whether the claim is settled on the basis of the sum insured or the market value at the time of the loss. The latter is more appropriate according to the principles of insurance, since indemnification should equal the loss suffered at the time the event occurs. If this is not done the insurance will be one of "agreed value". The exact procedure followed in different countries in practice is not clear from the material available. In India, however, it is specifically provided that the policies for "scheme" animals will be on the basis of "agreed value" and for others on that of market value. The introduction of a scale of indemnity based on the age and stage of reproduction cycle of the animal should be considered.

7. Premium rates

184. It has already been noted that in Ethiopia insurance extends over the full period of four years and that the premium rate is 8.96 per cent. As this is spread over four years, the annual premium (depending on the interest earned on the advance premium collected) works out at a modest sum. In Kenya when the scheme started the premium rate was 10 per cent per annum but it has been brought down to 8 per cent. A group discount ranging from 5 per cent to 15 per cent is given depending on the number of animals involved. If there is no claim within the 12 months of the policy period, a discount of 30 per cent is given. For groups of animals, a low claims discount - defined in terms of tranches of an incurred claims ratio of less than 30 per cent, 40 per cent and 50 per cent - is also given, of 30 per cent, 20 per cent or 10 per cent. For large groups of over 50 animals, special rates are negotiated. In India a rate of 5 per cent is charged for animals financed by banks and belonging to private dairies, and 4 per cent for animals belonging to cooperatives. An additional premium of 2 per cent is charged for exotic animals. There is also a 10 per cent discount for a group of 25 or more animals. For "scheme" animals a low rate of 2.25 per cent is charged. It is also possible to have long-term policies for three, four or five years, and a discount of 25 per cent is given in consideration of the interest that would be earned. It is significant to note that 62.2 per cent of the 18.2 million animals insured are "scheme" animals. Thus the average rate per animal in the total portfolio is low. In Pakistan a rate of 5 per cent is charged for dairy animals and a rate of 6 per cent for bulls and bullocks. An additional premium is charged for animals of an age higher than specified, and for exotic and high-yielding cross-bred dairy animals. In the Philippines, the rate is related to the sum insured, since higher value animals carry more risks. For individual farmers it varies from 3.75 per cent to 5 per cent for an insured sum of 6,000 pesos or less to 5 per cent for a sum insured up to 8,000 pesos. For higher value animals and for commercially-oriented groups of 14 or more animals the rate is 4.25 per cent, and is increased by 0.25 per cent per 1,000 pesos up to 11,000 pesos and thereafter by 0.50 per cent up to a maximum insured value of 20,000 pesos. This rate applies if, at the time of first insurance, the age was within seven months to five years. A loading of 0.25 per cent is applied for every additional year of age at the time of first insurance. Thereafter the same rate is continued up to a maximum insurable age of 12 years. Claims experience, and consequently the rates, are higher for groups of animals commercially raised than for animals individually raised by farmers. Tax must be paid on insurance premium, and the farmer has to share in it to the extent of 5 per cent of the premium. In Sri Lanka the rate is 4 per cent for coverage up to SL Rs 8,000 and 4.5 per cent for SL Rs 8,000 to SL Rs 10,000. Group discounts of 10, 15, 20 and 30 per cent are allowed for 2 to 5, 6 to 10, 10 to 50, and 51 or more animals. If, for five years, there has been no claim, a no-claim refund of 25 per cent of the total premium is allowed. In Zambia the rate varies depending on the amount insured, ranging from 4.5 per cent for K 10,000 to 6 per cent for K 50,000.

8. Livestock management strategy

185. Establishment of animal husbandry standards in a country is the responsibility of the government at the macro level. However, it directly

affects the insurance organization. The existence of a sound epizootiological system is essential for livestock insurance. In its absence, the risks would be high and hence the premium would also be high. Because of high premium rates, business development is affected, and this becomes a vicious circle. In practice, the insurance organizations in developing countries have taken the situation as it exists and have launched their schemes on the basis of the prevailing conditions. At the same time, they have adopted certain strategies of animal husbandry for prevention of losses.

186. An examination and certification of good health by a qualified veterinarian is a precondition for acceptance of a risk in all the countries. In practice, however, a pre-acceptance health check is sometimes not insisted upon if the animals are being insured in a large group, as is the case in the Philippines and Zambia. Insurers also insist on vaccination, as has already been noted, as a precondition for inclusion of certain diseases. Insurers often employ veterinarians on a full-time basis to carry out the assignment. This considerably strengthens the animal husbandry system in the country. In India over 400 veterinarians are employed by the insurance companies. Certification by a veterinarian is also required in the case of a claim to substantiate that the animal has died due to the perils insured. In view of the fact that the company's veterinarian may not be reached in time, a certificate by a veterinarian employed by the government or a parastatal agency is also accepted. Thus, there is close cooperation between insurance companies and the public animal husbandry departments. This works to the advantage of both. A working understanding with the animal husbandry departments is also helpful to the insurance company from a marketing point of view. In India the death of an animal can now also be certified in respect of "scheme" animals by any two of the following: the head (Sarpanch) of the village, an official of the cooperative society, an official from the milk collection centre, a supervisor or inspector of the Central Cooperative Bank, or an authorized representative of the extension service organization. This has become necessary in view of the magnitude of the business and has worked satisfactorily.

187. For farmers the expenses for veterinary services may be a considerable burden. In Pakistan a "Veterinary Cover" has been developed, which runs parallel to and in conjunction with the insurance policy. For a fee of PRs 200 per annum, veterinary services including vaccination, pregnancy diagnosis, treatment of sterility and visits by veterinarians are arranged.

188. One of the biggest problem areas in livestock insurance is identification of the animal insured. Although the Proposal Form provides for a declaration of the colour and distinguishing marks of the animal, these are often found to be similar for several animals. Since fine distinctions are not easy to make, it is difficult to establish whether the carcass produced is that of the insured animal. The problem is accentuated when the owner has several animals, but has taken credit from the bank for only one or a few.

189. Various methods of identification are in vogue. Plastic, aluminium, brass or polyurethane ear tags, and hot or cold branding are being used by insurance companies in various markets. Ear notching and muzzle printing

technology has not as yet been developed sufficiently to make its use economical in developing countries. Implanting an electronic device in the body of the animal, often the forehead, is admittedly the best method but too costly to be used in developing countries. A system based on genetic fingerprints, known as DNA analysis, is being developed, and may prove to be useful in the long run. 56/ The task of ensuring proper identification is an important but arduous administrative effort.

C. Linkage with other agencies

190. For both the operation and success of livestock insurance, the companies depend heavily upon linkage with other agencies. Owners of animals in developing countries are usually not sufficiently commercialized to seek insurance on their own initiative. It is on the basis of links with banks and other institutions giving credit for acquiring and rearing animals that livestock insurance has developed. The support of other agencies is also helpful for loss adjustment.

191. In Ethiopia, India, Pakistan and Sri Lanka, the livestock insurance programme are closely linked to credit, insurance being compulsorily required by the lending institutions. Livestock insurance is also required by banks as additional security in Algeria, Argentina, Madagascar, Malawi, Malaysia, Mauritius, Mexico, the Philippines, Turkey, Tunisia and Zambia. In India, a "Master Insurance Policy" is issued to the bank covering all the animals which the bank will finance. The bank will declare to the insurance company the animals financed, together with the certification of good health by the veterinarian. The recipient of the credit and owner of the animal is informed by letter that his animal has been insured under the Master Insurance Policy issued in favour of the bank, and of the procedure to be followed in case of a claim.

192. In Nepal two organizations other than insurance companies are running livestock insurance schemes. The Agricultural Development Bank, in cooperation with the Small Farmer's Development Project, manages a livestock insurance scheme to provide compensation in the event of the death of animals on which loans have been given to groups of very poor and small farmers. The Credit Guarantee Corporation Pvt. Ltd., established with the object of guaranteeing the loans provided by commercial banks for agriculture, industry and the services sector, also administers a scheme of livestock insurance directly linked with the bank loans given to individuals for the purchase of livestock. The scheme is operated through the banks which act as the link with the person involved. In Malaysia the Veterinary Department of the Ministry of Agriculture manages a Compensation Scheme, where an element of premium is incorporated in the price at the time of purchase of the animal from the Department. Compensation is paid against loss due to death. The Republic of Korea has two schemes. The first is the Special Livestock Insurance scheme for those who buy animals financed by the National Agricultural Cooperative Federation. The second is the General Livestock Insurance scheme operated by the National Livestock Cooperative Federation, which automatically covers animals transacted at livestock markets and where a part of the "transaction fee" constitutes a fund for indemnity in the case of a loss.

193. As has been discussed in the section on animal husbandry, very close working relations exist between insurance companies and the Animal Husbandry Departments of governments and the former rely heavily on the services of the latter. In Pakistan a team is formed at the local level consisting of an agent of the insurance company, an agent of the Animal Husbandry Department and the "mobile credit officer" of the Agricultural Development Bank. Livestock insurance is explained to the recipient of a loan and a contract is concluded without delay. 57/ Linkage with the Dairy Board, as in India and Israel, and with Farmers' Cooperatives can also be valuable and rewarding.

D. Administration

194. Efficient and effective administration is of the utmost importance for the success of livestock insurance schemes. It is all the more important as farmers will initially be suspicious of whether the insurance company will fulfil its promise of providing indemnity. One of the perennial complaints in livestock insurance is that claims take a long time to process. When the animal has been financed by a financial institution, the latter often hears of a claim long before the insurance company, and takes the lead in collecting the various documents and the certification necessary. This reduces the administrative workload of the insurance company, but is also the cause of delays, since bank staff tend to give low priority to insurance work, knowing that sooner or later the claims amounts will come through.

195. In India several steps have been taken to simplify the administration of livestock insurance. An "All-in-one form" has been devised. This single document incorporates the proposal, the receipt of the premium paid, the veterinary certificate and the policy. All the signatories sign in the respective places and the document is issued on the spot. Considerable simplification has also been achieved in claims settlement procedures.

196. Fraud cannot be ruled out in this field. At the grass-roots level, it is not easy to ensure that the pre-acceptance health check-up has been done as envisaged. Similarly, the verification of certain aspects may be difficult and there could be reasonable doubts. It is not always the case that all animals belonging to an owner are insured. If an uninsured animal dies, there is every possibility of producing a carcass and submitting a claim. The chances of malpractice and manipulation of the system through collusion are real. This is a threat particularly because the animal may be at a distant location and the carcass cannot always be kept until the arrival of the insurance company's representative. In the Philippines a detailed procedure for settlement of claims has been stipulated, including affidavits from two disinterested persons who are aware of the death of the animal, and photographs of the animal's carcass clearly showing identity or markings such as ear tag, body number or brand number. Nevertheless, payment of some wrong claims in a large portfolio of livestock insurance is inevitable. Absolute purity is difficult to achieve and efforts should be directed towards minimizing the extent of fraud.

197. Livestock insurance has been in operation for a number of years, and the problems are kept within manageable limits. During 1988-1990 the loss ratio was 28.1 per cent in Ethiopia, 81.3 per cent in India, 41.1 per cent in

Kenya, 63.6 per cent in Pakistan, 39.52 per cent for individually-owned animals (backyard scheme) and 100.74 per cent for commercially-oriented groups of 14 or more animals (commercial scheme) in the Philippines (1989-1991), 44.8 per cent in Sri Lanka and 18.82 per cent in Zambia.

E. Insurance of animals other than cattle

198. The design developed for insuring cattle can be adopted for other species of animals such as pigs, goats, sheep, horses, ponies, mules, donkeys, camels, elephants, deer, etc., with suitable modifications. The life cycle of the animal and the purpose for which it is kept will determine the age span for insurance: for pigs it will be short, a little longer for goats and sheep, and much longer for horses, camels and elephants. Perils covered are generally the same, but the diseases covered may differ according to genetic and local factors. Goats and sheep are usually in herds and it is possible to have a franchise in terms of the number of animals in the herd. Since the morbidity and mortality rates of small animals are high compared to those of cattle, it is usual to provide for only 80 per cent of the sum insured as indemnity. The amounts for which insurance can be given for these animals also have to be decided separately depending on the animals' market value. Variations can also be made empirically in the premium rates. Similar systems of animal husbandry and identification as with cattle will have to be established.

F. Transportation of livestock

199. Transportation of animals has increased in recent times primarily for two reasons. First, many countries have initiated programmes to improve the strain of indigenous animals, and high-yielding breeds are being imported in large numbers. Secondly, live animals are transported within the country or exported abroad for slaughter when local facilities are not up to the required standards. Risk of injury or death during transportation is normally excluded under livestock insurance and a separate marine transit insurance has to be negotiated. Unfortunately, many casualties take place since the ships entering developing countries are often unspecialized general-purpose cargo ships, and arrangements for ventilation and provision of water and feed are poor. By insisting on proper arrangements as a pre-requisite of shipment, insurance companies can significantly contribute to reduction of losses as a part of risk management.

G. General observations

1. General

200. Livestock insurance is one of the simplest of the various forms of agricultural insurance. This is evident from the fact that it has been practised in different forms for a long time and is the genesis of agricultural insurance. Apart from its developmental role, it provides an opportunity to the insurance industry to make a meaningful entry into the rural sector. Once a foothold has been established through livestock insurance, other types of rural insurance can be developed.

201. It is significant to note that, unlike crop insurance, livestock insurance does not create a serious financial burden for the insurance company, nor does it require a substantial State subsidy, even when provided to the traditional sector farmers. A subsidy is provided in Israel and Nigeria, but it is not particularly for livestock insurance, but a part of the support to all other types of agricultural insurance. The overall situation is that the loss ratio is usually within manageable limits. Administrative expenses are, of course, higher than in other lines of business. But even if a small loss is incurred, either because the claims or the management expenses are high, it is possible to cover such losses by the profits from other departments. The amounts involved are not substantial.

202. Livestock insurance has to be designed carefully, but no conceptual problems are involved. In countries where it has not yet been introduced, the schemes in other similarly situated developing countries can be examined, and suitable modifications made to meet specificities of the country situation. Changes and refinements can subsequently be incorporated on the basis of experience gained. There is no need to wait for a perfect scheme. Moreover, the dimension of loss due to initial imperfections is limited. The main challenge of livestock insurance lies in its administration and in extending it to newer areas and covering a larger number of animals so that it becomes an effective instrument for the development of the rural economy.

203. Governments view livestock insurance as supporting the development of the agricultural sector and are interested to see that it is made available and gradually extended. The necessary support from various authorities is therefore normally forthcoming. At the same time, unlike crop insurance, there is not much political interference; this is thus an area where insurance organizations can take operative decisions and devise control systems according to their own judgement. Private insurance companies may find this an effective method of entering the rural area.

2. Administrative aspects

204. The spread of risks is important in livestock insurance. A small portfolio will always remain unviable. Hence, once a scheme has been devised, and the initial trial or pilot stage has been completed, efforts should be made to extend the coverage increasingly to newer areas so that a sufficiently large and stable base is established.

205. A dilemma exists on two counts. First, because mortality data are poor and animal husbandry standards inadequate, the safety margin may have to be kept high. But this may make the product unaffordable to a large section of the potential clientele and could be an important impediment to the growth of business. The answer has to be found locally. In general, the premium rates which may have been originally set at a high level should be gradually adjusted as the business expands and effective control systems are devised. In any case, livestock insurance should not be perceived as a high-profit area.

206. The second dilemma is in respect of the extent of decentralization. Livestock insurance can be effective and expand only under a decentralized regime, with authority for acceptance of risk and settlement of claims

delegated to the field formations. This, however, may lead to laxity in enforcing the stipulated requirements. The answer has to be found in striking a balance of convenience, and in the creation of an effective system of inspections, checks and constant vigilance.

207. The role of veterinarians in livestock insurance is obvious but requires reiteration, since it is on their experience and efficacy that acceptance of risks and settlement of claims depend. It is advisable for an in-house cadre of veterinarians (for livestock, poultry and aquaculture insurance, and agronomists for crop insurance) to be gradually developed. It has often been the experience that these professionals are able to integrate quickly into the mainstream of insurance. They are also successful in marketing efforts as they are familiar with the scene of action, and are trusted by the owners of the animals and farmers. Despite the in-house facilities, however, the advice and help of those in the profession of animal husbandry, although belonging to other organizations, such as those working for the banks and the clients, should be taken. In the initial stages the volume of work may be small, but, as business builds up, the possibility of contracting out the task of monitoring the animal husbandry of animals in a given area to selected private professionals should be explored. This will generate new opportunities of employment and promote individual enterprise. What is more important, a measure of comparison will be available with the quality of service rendered by the in-house personnel.

208. In the event of the death of the insured animal and payment of the claim by the insurance company, the process should not end with the bank squaring up the outstanding loan. A fresh loan should be granted by the bank so that the farmer is able to make a new investnment in an animal and continue in his avocation. It is true that this cannot be made a policy condition, but insurance companies can make efforts in this direction. Their endeavours would be appreciated by the farmer and may lead to his buying insurance for other perils, depending upon his other insurable assets and the extent to which he can afford to pay. These observations also apply to the farmers belonging to the semi-commercial and emerging sector.

3. Underwriting aspects

209. Procedures should be constantly reviewed to search for possible avenues of simplification, particularly in the area of claims settlement. The adage that there is no worse publicity for insurance than delay in settlement of a claim is clearly applicable in the case of livestock insurance.

210. Large dairies and fattening farms for rearing of herds for meat, described in the United States of America as "feed lots", correspond to the commercial and specialized production sectors. They have to be treated differently. Often they resort to self-insurance, in spite of allowances and discounts, as the premium is regarded by them as high. Three interesting models have been developed in Zambia, each with progressively reduced premium rates. Under the "Scaled Indemnity Cover" scheme, suitable for herds of 8 to 60 animals, the extent of indemnity is related to the number of animals lost. For example, for the first animal lost only 25 per cent of the sum insured per animal is indemnified. For the second and up to the fifth animal lost, the indemnity is 50 per cent, while it is 100 per cent for further loss of

animals. The rationale is that the loss of one animal in a herd is not abnormal and that the owner can bear a major part of the risk. Animals can still die and up to the fifth animal the owner is partly self-insured. But when the mortality is beyond normal expectation, he is compensated in full. In this way the real risks that affect the economic viability and livelihood of the farmer are covered. In the second scheme known as the "Large Herd", a normal mortality rate is first established on the basis of records available and negotiation, and the insurance company indemnifies for deaths of animals beyond the agreed mortality. The cover is suitable for herds of over 50 animals. The third cover, the "Large Herd Catastrophe Cover" becomes operative only if a properly defined catastrophe, such as an epidemic, takes place. It is suitable for herds of over 100 animals. Similar innovative efforts should be made particularly when efforts to persuade a large dairy or animal farm to take normal per animal insurance do not succeed.

4. Group basis of insurance

211. The four sectors of agriculture described in chapter I are also relevant here. In many countries animals are kept by small and traditional farmers or individuals. The cost of delivery of insurance services to them on an individual basis is high, and problems of anti-selection and moral hazard are accentuated. Marketing of insurance on a group basis has to be adopted. The group could be a cooperative or other similar organization. When a link has been established with credit, it becomes an important group since loans will have been given to a large number of farmers.

5. New livestock covers

212. In countries where livestock insurance for death risk has gained acceptance, efforts can be made to introduce insurance for specific risks in accordance with the requirements and practices prevalent in the country. A specific policy will have the advantage of more directly answering the particular and more pressing needs and, at the same time, of being cheaper and more affordable than a standard policy providing a wider cover. The following are some of the suggestions made:

(a) A number of developing countries have adopted cross-breeding programmes for improving the production potential of their livestock. In this context, the breeding and calving risk has become an important peril. Specific policies covering the breeding and parturition (calving) risk of high-value animals can be introduced. The death risk of newly born calves at the time of parturition and then up to a specified age, particularly in the case of cross-bred and exotic calves can also be considered. As these covers will act as a catalyst for cross-breeding programmes, support from governments may be available.

(b) Breeding of pets has emerged as an important commercial activity in some countries. Whelping of pets and death of the litter can be covered by specific policies.

(c) Insurance for specific epidemic diseases likely to be encountered can be designed. These schemes can be linked with legislation on animal disease.

(d) Insurance for consequential loss suffered due to diseases such as foot and mouth and brucellosis, where the morbidity rate is high and the production capacity is seriously affected, can also be considered. In the United Kingdom consequential loss cover is available for foot-and-mouth disease. However, since the statute provides for intentional slaughter of the affected animal and compensation for the value of the livestock is given by the State, insurance provides only for expenses towards maintenance of technical staff, labour, loss due to effect on market supply, etc. However, in developing countries where there may be no provision for payment for the affected animals, consequential loss insurance would be of relevance.

(e) Short-term policies for transit, show and sale risks for various classes of livestock can also be introduced.

(f) In some countries there are laws for compulsory veterinary inspection of a dead animal before economic utilization of the carcass. There is a risk that the carcass will have deteriorated by the time inspection is carried out. The carcass can also be condemned. Insurance can be designed to cover the specific risk of non-utilization or rejection of the carcass. Insurance is available in developed countries for similar risks.

6. Livestock insurance and the environment

213. Livestock insurance can play a role in maintenance of the environment. Conditions and guidelines can be stipulated in insurance policies for the proper disposal of livestock waste. Scientific disposal of carcasses, excreta, particularly faecal material, is important from the hygienic point of view, as also for recycling it to the fields after conversion into nitrogen-rich manure. This improves soil fertility and thereby contributes to environment maintenance. Proper disposal of carcasses of insured animals and certificates to this effect from village authorities can be made a requirement for insurance claims. A discount in premium rates for animals linked to biogas plants can also be considered, since the use of biogas in stoves reduces production of carbon dioxide and fumes, and residual slurry can be used as manure. This becomes an environment-friendly measure. A number of animals are slaughtered, eviscerated and dressed for meat purposes and this produces a substantial volume of slaughter waste. A scientific method for its disposal would be environment friendly. This would also improve the risk since many losses originate from the waste. One way is to "render" the slaughter waste and recover economically valuable by-products such as blood meal, meat meal, feather meal, fish meal, etc. These are protein rich by-products which can be used in animal feed. The process of rendering could be supported by insurance companies by way of a suitable discount while granting cover to meat purpose animals.

7. Reinsurance

214. The outbreak of an epidemic affecting a large number of insured risks remains a danger. Typhoons and floods may lead to some increase in mortality although the effect of natural catastrophe on animals is not as severe as on property. Furthermore, a trail of disease is often left, which takes its toll in the long run. In a large country, or where the risks are well spread or a substantial base of insurance has been built up, this may not pose a problem. In other countries the possible impact of a catastrophe is a deterrent in expanding livestock insurance business. Stop loss reinsurance protection may be negotiated, if available at a reasonable price. Such reinsurance has been obtained for the livestock insurance programmes in Kenya and Zambia.

Chapter IV

POULTRY INSURANCE

Introduction

215. In recent years poultry rearing has emerged as an important economic activity. In fact, in the last two decades it has been the fastest growing sector in agriculture in many countries. This is due to a high productive rate and a short generation period, coupled with the adoption of efficient production methods. Eggs and poultry meat are a high quality, low-fat source of protein and are economical compared to other sources of animal protein. Poultry meat has unique properties compared to red meat, such as lower animal fat and more nutrients per calorie unit; it is also easily digestible. Poultry are an efficient converter of plant-based feed into a nutritionally rich source of food, the conversion rate being high with 2 kg of feed to 1 kg of meat. Poultry farming can also be a source of substantial employment opportunities. Furthermore, as the turnover is high, a properly managed farm can yield a good income.

216. Many governments in the developing countries have encouraged the growth of poultry farming. This was recognized in India where, in the 1989 annual budget, a concession was given in tax on income from poultry farming since "poultry is emerging as an important activity enhancing nutrition and providing employment."58/

A. Spread of poultry insurance

217. It is difficult to insure a few birds, particularly of indigenous nondescript breed reared by individuals in the backyard either for personal consumption or for the market. The value per bird is small, identification is not practical, mortality is often not controllable and the mobility of the birds increases the moral hazard. Therefore poultry insurance is considered only for farms managed on commercial lines.

218. Significant advances have been made in the technology employed in poultry farms in many developing countries. Hybrid birds are reared in controlled atmospheric conditions with mechanized feeding and watering. The birds are often in several floors of cages, placed on top of each other and with artificial light so that the birds are awake during the night hours as well. (This practice is now discouraged in developed countries.) Good quality feed is also available. Thus, poultry insurance is a practical proposition in many countries. As will be noted from the discussion that follows, the business is manageable if due precautions are taken. At the same time, in a number of countries the technology is not yet fully stabilized. The large number of birds in one location leading to the accumulation of values, low value per bird, a short life cycle, susceptibility to pathological and climatic occurrences, the quickness with which they die if something goes wrong (for example, chill if the heating system breaks down), and lack of access to veterinarians all add up to a

seemingly volatile situation. Thus, poultry insurance schemes have not as yet been formulated in a number of developing countries.

B. Design of poultry insurance

219. This chapter broadly follows the pattern of chapter III on livestock insurance. Issues relating to species and breed, size of farms, age (or life cycle within which insurance is offered), perils covered, sum insured, premium rates, and farm management strategy and administration, including linkages, are discussed. This is followed by a discussion on loss assessment, and a few general observations. Poultry insurance schemes in India, Mexico, Nigeria and the Philippines are cited. Here, again, a comparison is possible since the schemes are somewhat similar.

1. Species and breed

220. The term poultry, although very often used as synonymous with chickens, includes a number of other avian species such as ducks, turkeys, geese and guinea fowl. The raising of quails has also been taken up in many countries. None the less, chickens are the largest component, and are discussed below. For purposes of commercial farming and insurance, chickens can be classified in three categories. First, breeder birds, raised for the production of fertilized eggs which on incubation produce young chicks as broilers or layers. Initially, pureline breeders are imported from internationally reputed establishments and become the grandparents or parents of local strains of breeders. Secondly, broilers or table birds, to be used for chicken meat. And thirdly, layers, or birds reared to produce unfertilized eggs. In the Philippines, the birds are classified as broilers, layers and pullets. A pullet is a young bird in rearing, which on sexual maturity becomes a layer. Breeders are not normally insured, and can be covered only on a case-by-case basis after negotiation and on examination of the technical details of the management practices followed. The different categories of birds have distinct life cycles and values, and can be raised in different sections of a composite and integrated farm. However, with gradual specialization it is common to find hatchery farms breeding only day-old chicks and passing them on to broiler and/or layer poultry farms.

2. Size of farm

221. It is possible for several batches of birds to be raised simultaneously, a fresh batch being introduced while an earlier batch has moved further in its cycle. (It is essential to ensure, both from insurance and farm management points of view, that the different batches are kept separately and, in fact, housed in entirely different compartments.) The total number of birds in a farm can thus be substantial, going up to tens of thousands. This increases the risk, not only because the different batches have to be treated differently, but also because of the accumulation of values at one location. However, it should be possible to take care of this, if necessary by reinsurance. Indeed, a large farm is preferred since it is likely to employ better technology and management systems. However, it is essential to stipulate a minimum size or population (or stock level) of birds per batch. Only then can a reasonable level of care be ensured, and the law of averages can operate. In India it is 500 for broilers, 1,000 for layers and 5,000 for

breeders; in Mexico it is 10,000 for broilers, 10,000 for layers, 3,000 for breeders and 1,000 for high-value pureline breeders; in Nigeria it is 100 for broilers, 100 for layers and 500 for breeders; in the Philippines it is 5,000 for broilers and 1,000 for layers and pullets.

3. Age

222. Broilers are insured in India between the ages of 1 day and 8 weeks, in Mexico 6 weeks and 10 weeks, in Nigeria between 1 day and 10 weeks, and in the Philippines, 1 day and 8 weeks. Broilers attain a weight of 1 to 1.5 kg around this age and are then sold. For layers the age stipulated is: India 1 day to 72 weeks (insurance can be obtained for 1 day to 20 weeks, 20 weeks to 72 weeks and 1 day to 72 weeks), Nigeria 1 day to 52 weeks, with a strong recommendation for an extension to 72 weeks, Mexico 16-18 weeks to 65-70 weeks, the Philippines 18 weeks to 75 weeks, or as specially agreed. The stipulated age for pullets is 1 day to 22 weeks. The overlap between 18 to 22 weeks is to accommodate the variation in the age of sexual maturity. The following age has been stipulated for breeders: India 1 day to 72 weeks, Nigeria 1 day to 52 weeks with a strong recommendation for an extension to 72 weeks, and Mexico 25-26 weeks to 64-66 weeks for the heavy (pesadas) variety and 16-18 to 52-60 weeks for the light (ligeras) variety. Both for layers and breeders, the reprcduction process ceases or rearing becomes uneconomical at the top age indicated above, and the insurance ends. The birds are disposed of for meat.

4. Perils covered

223. Loss of birds due to death caused by accident or disease is covered. However, there are some variations in what constitutes these two elements. Accident: In India it includes fire, lightning, flood, cyclone, famine, strike, riot and civil commotion. In Mexico accident is not an integral part of the policy and has to be specifically agreed. When included, it covers, in addition to fire, lightning, explosion, earthquake and flood, "other natural phenomena of an extraordinary kind". In Nigeria fire is not a normal part of the policy but may be covered as an additional peril. Similarly, in the Philippines, typhoon and flood have to be specifically agreed. However, earthquake is excluded both in Nigeria and the Philippines, and in the latter riot, strike and civil commotion are also specifically excluded.

224. War and nuclear-related risks are excluded, as is the case in most insurance policies. Other exclusions are: malicious or wilful injury or neglect or unskilful or inappropriate handling; theft; mysterious disappearance or other unaccountable shortages in Nigeria and the Philippines; clandestine sale of birds in India; destruction by order of the public authorities in Nigeria and the Philippines; intentional slaughter or destruction except when necessary to terminate incurable suffering on humane grounds upon being certified by a veterinarian or public authority in India; defects in the heating or ventilation systems; administration of medical or biological treatments other than under the supervision of a veterinarian, experimental procedures and tests in Mexico; permanent and partial disability, malnutrition, undergrowth, action of predators like preying birds and carnivorous animals in India. Furthermore, there are a few inherent risks in bird rearing, such as cannibalism (a bird will occasionally rupture

its oviduct while attempting to lay an oversized egg, and other birds noticing the soft red flesh will start pecking with the result that the intestines are pulled out), debeaking (birds dying due to trimming of the beak so that they do not hurt each other and indulge in cannibalism), huddling or piling (a variation in temperature may cause the birds to crowd together in a corner leading to their death from suffocation). The caretaker is expected to ensure that these do not happen and losses arising from such occurrences would be excluded under the general exclusions on grounds of inappropriate handling; none the less these are specifically excluded in India. Risks of suffocation, overcrowding, stampeding, nervous tension and activities of predators are also specifically excluded in Mexico.

5. Diseases

225. In Nigeria the following diseases are covered provided the birds have been properly vaccinated and other preventive measures are continuously taken: Newcastle disease, avian infectious bronchitis, avian diphtheria, avian leucosis complex, infectious coryza, infectious bursal disease (gumboro), chronic respiratory diseases (CRD), tuberculosis, Marek's disease, coccidiosis and colibacillosis. In the Philippines these diseases (except colibacillosis) are also covered. However, vaccination for Newcastle disease is essential. Avian malaria and escherischia coli can also be included, again subject to vaccination and the adoption of other preventive measures. In India avian leucosis complex is specifically excluded. Newcastle, avian infectious bronchitis, Marek's disease and fowl pox require proper vaccination. A clean certificate from the competent government authority is required for salmonellosis. Other diseases are covered if preventive and curative measures are taken. In Mexico salmonellosis of any kind, ascites, mycoplasmosis and viral hepatitis are specifically excluded for broilers, and salmonella, coryza and lymphoid leucosis for others. Furthermore, the diseases have been distinguished as epizootic (a disease affecting a large number of birds in an area and so determined by the government authorities), and enzootic (a disease affecting birds in a particular season or peculiar to the region). The former are excluded from the scope of insurance whenever the Federal authorities declare a disease to be epidemic. Also, diseases "vertically" transmitted, i.e. a disease genetically transmitted from one generation to another, are not covered. However, there is a provision that specific diseases can be covered by agreement, depending upon the area and their incidence.

6. Sum insured

226. In this section the practices followed regarding fixing of the sum insured, the related matters of excess and deductibles, and the basis of indemnity, are discussed. In Nigeria the sum insured is based on the cost of day-old chicks at the time of purchase, plus the costs of inputs, up to the end of the life cycle. Detailed standard input costs per week have been worked out for different regions, showing cost of feed, various vaccines and medication, layout and utility costs, and contingencies. These may be varied if substantiated by the proposer. The same figures are used for determining the sum insured and for settlement of claims. There is a franchise (minimum loss to attract a claim) of 10 per cent of the number of birds in the batch in the case of broilers and breeders, 7 per cent for day-old to 24-week old

layers and 3 per cent during the 25th to 52nd week of their life cycle. In addition, there is a deductible of 5 per cent on every claim (which the insured has to bear, the indemnity thus being 95 per cent). In the Philippines a similar principle is followed: for broilers it is equivalent to the estimated market price at the end of the rearing period, and for layers the estimated value at the time of highest reproduction or the 27th week of life. An addition of 20 per cent is allowed to represent additional costs such as cleaning and disinfecting before a new batch is introduced, and the profit margin. While premium is calculated on the sum insured arrived at on this basis, the fact is recognized that the birds do not have a value equivalent to their peak period throughout the life cycle, and for loss assessment purposes a table is provided showing variations in value. For broilers it starts at 20 per cent of the peak value during the first week and increases to 100 per cent at the end of the 8th week. For pullets and layers it begins at 20 per cent during the first week and increases to 100 per cent at the end of the 27th week, but then starts declining to 44 per cent at the end of the 75th week. For the second laying period it is fixed at 45 per cent throughout the bird's life. There is also a deductible ranging between 1.5 to 2.5 per cent of the entire sum insured, depending upon assessment of the risk by the company. In Mexico valuation tables are worked out after discussion with the proposer on the basis of weekly estimates of production costs submitted. This is verified against the prices prevailing in the market and the information collected and published by the Unión Nacional de Avicultores. Account is also taken of the breed of birds, the numbers involved and the level of integration. In India a valuation table is worked out showing week-wise values, beginning with Rs 6.50 during the first week to Rs 20 in the 8th week for broilers, Rs 7 to 37 in the 24th to 37th week and then declining to Rs 23 at the end of the 72nd week for layers, and for breeders beginning at Rs 55 in the first week and going up to Rs 160 at the 44th to 47th week, thereafter declining to Rs 40 at the end of the 72nd week. For high value breeders there is a possibility of negotiating a higher value but this is not to exceed Rs 200 per bird. The total number of deaths occurring during a period of seven days is treated as constituting a claim. Mortality during this period must exceed 5 per cent of the total number in the batch for a claim to be considered. In addition to this franchise, there is a deductible of 5 per cent of the number of birds in the batch for broilers, and 5 per cent for layers and breeders during the first 8 weeks, 2 per cent during the 9th to 20th week and 1 per cent per month during the 21st to 72nd week.

7. Premium rates

227. In poultry insurance, the premium is charged for the life cycle of the birds, and not on an annual basis. In India it is charged on the peak value of the birds, and is 1.75 per cent per batch (or 6.5 per cent for five batches in a year) for broilers and 3 to 3.75 per cent for breeders. For layers three options are available to the insured. First, to insure from the first day to the 20th week, in which case the rate is 3.33 per cent; second, to insure from the 21st to 72nd week, the rate being 4.05 per cent; and, third, to insure from the first day to the 72nd week, when the rate is 5.4 per cent. In Nigeria, the rate is 7.5 per cent, half of the premium being subsidized by the Government. In the Philippines the rate is 1.75 per cent for broilers from 1 day to 8 weeks, and 3 per cent for pullets

from 1 day to 18-22 weeks, 3.5 per cent per year for layers for the period beginning from the 18th-22nd week (when the bird starts laying eggs) to the 75th week, or as agreed. In Mexico the base rate is modified according to the characteristics of each farm and its location. If there is no claim during the first year in India, there is a discount in renewal premium of 5 per cent, and of 7 per cent for two claim-free years and 10 per cent for three. In Nigeria there is a constant 5 per cent no-claim discount.

8. Farm management strategies and administration

228. Poultry rearing requires that a high degree of animal husbandry practice is followed and that the management of the farm is efficient. This is ensured by the insurance companies, first, by careful selection of farms to which insurance is offered; second, by imposing stringent obligations on the insured; and, third, by close monitoring of the operations of the farm. The various elements of this strategy are indicated below (not countrywise, since a number of conditions are similar but expressed differently. Only when a condition is significantly different in a country is this indicated.) A Proposal Form elicits detailed information of the risk. A health certificate by a veterinarian is also required. In India it is stipulated that no blanks should be left. The Proposal Form in Nigeria is particularly exhaustive, consisting of eight parts, inquiring about the proposer, the birds, the location of the farm, the feed and the feeding process, therapeutic and prophylactic history, the anticipated risk, the precautionary measures and the financial position of the farm. A poultry farm is insured only as long as it is under the ownership of the insured, and change of insurable interest is not allowed. All the birds on the farm must be insured, and partial insurance is not allowed. The farm must have either an employed veterinarian or the services of a named consultant veterinarian. As has been noted, many diseases are not covered at all, and for others vaccination is obligatory. Debeaking and deworming have to be carried out regularly. Good housekeeping has to be observed. In the Philippines it is specifically stipulated that diligence has to be exercised in the selection of employees. In the scheme prevalent in India one of the exclusions reads: "Improper management". This may be considered as vague and general, but clearly conveys a message. Fences, yards, sheds and cages have to conform to the standards prevailing in the country and have to be properly maintained. A properly balanced diet, water and light have to be supplied. The new birds introduced must be examined by a veterinarian, and must be of an approved breed procured from a recognized hatchery.

229. The insurance company must be informed whenever additions take place. Birds suffering from a disease must be immediately separated. The insurance company's veterinarian or a representative usually inspects the risk before acceptance of insurance and at least once in between. Instructions and advice from the insurance company must be implemented. In Mexico it is stipulated that this must be done within three days of tendering of the advice. The following records must be maintained and some of them sent to the insurance company: daily stock of birds, mortality, culling (removal of crippled, weak, runty, undersized or diseased birds), vaccinations given, feed consumption, production, debeaking and deworming, incidence of disease, and preventive and curative treatment given. In India and the Philippines it is stipulated that the insurance company must be informed of the outbreak of

any epidemic disease or of any event likely to give rise to a claim within 12 hours of its occurrence.

230. Linkage with animal husbandry departments of the Government is important for poultry insurance. They usually have qualified and experienced veterinarians and are also familiar with the peculiarities of poultry farming. They are responsible for overseeing the introduction and maintenance of minimum standards of animal husbandry. Insurance companies therefore depend on them for advice and guidance and other certification. In fact, diseases to be included, or excluded, and vaccinations and other preventive measures required to be taken are initially worked out in consultation with them.

9. Assessment of loss

231. Extreme care has to be taken in assessing the loss suffered and the compensation payable. The most significant aspect of the loss assessment process is early intimation of the claim. In Nigeria the claim must be intimated within 24 hours and in India within 12 hours. A post-mortem certificate has to be attached with the claim form. Dead birds have to be kept for a stipulated time for inspection by a representative of the insurance company. Salvage value is deducted from the claim amount in the schemes of various countries cited except in India, where this right has been given up in view of the fact that practically no value is received from diseased dead birds and it only involves fruitless administrative work.

C. General observations

1. General

232. In the poultry insurance schemes cited, the loss ratio during the last few years has been as follows: India 70.32 per cent during 1984-1989/90; Mexico information not available as the programme is a recent one; Nigeria 10.5 per cent in 1989 (figures for earlier years are not readily available), and the Philippines 55.47 per cent during 1989-1991. Thus, the programmes have been generally financially viable.

233. The economic viability of poultry farming must be kept in view. This keeps changing due to variations in the cost of inputs like feed, electricity, labour, transport and municipality charges for water, etc. On the other hand, demand for the products may be very price elastic, reducing the possibility of price increases by producers. Imbalance in the economics of operations would have a bearing on moral hazard.

2. Administrative aspects

234. Knowledge of insurance has to be combined with that of practices followed in poultry rearing. In fact, the success of poultry insurance will depend largely on the control of the technical details. In particular, services of in-house veterinarians are essential for insurance companies to control this class of business. In the initial stages a veterinarian can combine monitoring of poultry together with livestock, and other lines of

business such as aquaculture. Specialization can be achieved as the volume of business builds up.

3. Underwriting aspects

235. An active underwriting policy has to be followed. Certain minimum standards for rearing birds and farm management have to be laid down. This will improve the practices that farms must follow to achieve positive results, and will also be in the interest of overall economic development. The authorities realize the role played by insurance companies, and their support is readily available.

236. Poultry farms belong to the commercially-oriented sector, and insurance companies should find it feasible to provide insurance. The high risk of mortality can be countered by imposition of strict conditions. If the situation so demands these may be made even more stringent. For example, if there are frequent electricity breakdowns in the area, a generator may be required. The design of ventilators, cages, etc., may be specified. Proper sanitation is important in poultry farming. If the quality of the available feed in the area has not yet been standardized, this may have to be specified. National agricultural institutions could be consulted.

237. Quick action is the key to a successful poultry insurance programme. Insurance companies should therefore reorganize their systems wherever necessary so that the nearest and most accessible office is able to act without loss of time and will not have to wait for authorization and clearances.

238. In most countries the required vaccines and medicines are available, but it would still be advisable for the insurance companies to check on this. Incidentally, the administration of vaccine is not a problem since it can be given orally with the feed. The hatcheries give the initial dose to the young birds before they are transferred for rearing as broilers and layers.

4. Poultry insurance and environment

239. Poultry rearing and processing generates a substantial volume of waste and its ultimate disposal may have environmental implications. The organic nature of the waste could cause a bacterial boom, and a depression in oxygen levels could severely disrupt biota in receiving streams. Waste discharged into a sewage treatment system might be a significant load. While inspecting poultry farms, the insurance companies could ensure that various regulations in this respect are duly complied with. If possible, this aspect should be taken into account in finalizing the terms of insurance.

Chapter V

AQUACULTURE INSURANCE

Introduction

240. The production and catching (capturing) of live aquatic organisms have been practised since time immemorial. 59/ These organisms provide a valuable source of protein and have a low fat content with a good proportion of unsaturated fatty acids. Approximately 1.5 to 1.2 kg of feed leads to an increase of 1 kg in the body weight of fish. Requirements of energy and space are less than for warm-blooded animals and poultry. No energy is used for maintenance of body temperature.

241. Aquaculture generically means cultivation of plants or breeding of animals in water. For operative purpuses, FAO has defined it as follows: "Aquaculture is the farming of aquatic organisms, including fish, molluscs, crustaceans, and aquatic plants. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Farming also implies individual or corporate ownership of the stock being cultivated." 60/

242. The implication of this definition is that activities connected with capturing (catching) fish and other aquatic organisms from open seas, lakes, ponds and rivers accessible to all are not aquaculture, and are to be classified as relating to fisheries. Fisheries are to be regarded as aquaculture only when an individual or an enterprise has exclusive ownership rights to cultivate in an area.

243. From our point of view this means that a large section of fishing in developing countries is not aquaculture but activities connected with fisheries or the capturing of fish. A large number of traditional and emerging and semi-commercial sector fishermen who catch fish either from the sea in coastal areas or from inland waters will fall into this category. Providing insurance for loss of fish while in water is difficult. When the stock of fish is open to all and does not belong to any specific person or body its measurement is not possible, either at the inception of insurance or after occurrence of an event giving rise to a claim. Insurable interest (a financial relationship, recognized by law, between the insured and the subject-matter of insurance), which is an essential prerequisite for a valid insurance contract, does not exist.

244. Aquaculture, on the other hand, can be a proper subject for insurance. The insurance will relate to the commercial and specialized production systems of fish and related species. The extent of aquacultural activities in developing countries differs widely but is growing at a fast rate. Table 5 gives the value of aquaculture production in developing countries where it was more than US$10 million in 1989. Considerable investments are being made, and external financing by way of foreign commercial credit and international aid is available. 61/

A. Spread of aquaculture

245. Aquaculture is a comparatively new line of business. In Europe it was taken up only in the early 1970s. 62/ It is, therefore, understandable that not many developing countries have as yet formulated aquaculture schemes in a systematic manner. Out of 44 countries providing data in response to the UNCTAD secretariat questionnaire, only 6 reported offering aquaculture insurance. Another reason for this low reporting could be that properly managed aquaculture farms exist in only a few countries. If the demand for acquaculture insurance is limited to only a few cases, it is perhaps found more practical to obtain a model from a reinsurer and offer it to the client, acting more or less as a front organization, rather than developing a local model. However, in view of the potential for growth of this activity, insurance companies in developing countries may consider acquiring a knowledge of the business and taking an active interest in the underwriting of this specialized line. This would also help the national economy by generating new employment opportunities and earning valuable foreign exchange.

Table 5

Value of aquaculture production in developing countries where it exceeded US$10 million, 1989

Country	1989 value	Country	1989 value
Bangladesh	237,854	Korea, Rep. of	550,223
Brazil	72,288	Malaysia	43,326
Chile	78,633	Myanmar	20,784
China	7,905,694	Mexico	34,784
Columbia	36,707	Nigeria	33,744
Cuba	18,731	Panama	17,760
Ecuador	583,602	Peru	24,052
Egypt	85,500	Philippines	708,425
India	599,000	Romania	95,000
Indonesia	1,126,597	Sri Lanka	10,250
Iran, Islamic Rep. of	28,000	Thailand	516,925
Iraq	50,000	Turkey	12,388
Israel	34,179	Viet Nam	409,180
Korea, Dem. Rep. of	289,688	Yugoslavia	41,710

Source: FAO, Aquaculture Production, 1986-1989, Fisheries Circular No. 815, Revision 3 (July 1991).

B. Design of aquaculture insurance

246. The design of aquaculture insurance will depend upon the nature of the farm and the system employed. An aquaculture unit can be onshore, with indoor or outdoor tanks, natural or excavated ponds, "raceways" (a narrow and long facility, water entering from one end and emerging at the other), or a recycling plant. It can be a tidal enclosure, with either constant water exchange or partial water exchange at high tide. It can also be offshore, with flooding cages, mid-water cages positioned between the water surface and sea bed, or cages positioned on the sea bed. The essential point is that it should be an exclusive area under the direct control of the enterprise. Cultivation can be for food, both for the domestic market and for export, or for industrial purposes. All living aquatic organisms such as fin fish, crustaceans, molluscs and aquatic plants may be the subject-matter. The density of the stock may vary from 1 kg/m^3 in semi-intensive farming in smaller areas where artificial feed is added to 100 kg/m^3 in recycling plants in enclosures and with environmental control.

247. The pattern of this chapter is broadly similar to that of the previous chapters on livestock and poultry insurance. The practices followed in respect of the insurance of aquaculture farming are discussed in terms of species, age (or life cycle within which insurance is offered), perils covered, sum insured and indemnity, premium rate, farm management practices and administration, and assessment of loss. Aquaculture insurance schemes in India, Bangladesh, and Chile are cited and their common features compared. The scheme in India relates to fresh-water fish in inland tanks and prawns (shrimps) in brackish water, the scheme in Bangladesh to prawns in brackish water, and in Chile primarily to offshore cultivation. This discussion is followed by brief sections on the insurance of tanks and ponds in which aquatic organisms are reared, insurance of equipment used, and insurance relating to the capturing of fish. The chapter concludes with some general observations on the subject.

1. Species

248. Aquatic organisms cultured for commercial production can be classified into four groups. First, fin fish, which are cold-blooded vertebrates with gills and typically an elongated body usually covered with scales. Species commonly cultured in this group are grass carp (*Ctenopharyngodon idellus*) in India, Bangladesh, China and Taiwan Province of China; common carp (*cyprinus carpio*) in Bangladesh, India, Indonesia, China, Africa and Taiwan Province of China; catla (*Catla catla*) in India and Bangladesh; rohu (*Labeo rohita*) in India and Bangladesh; mrigal (*Cirrhinus mrigala*) in India and Bangladesh; silver carp (*Hypoph-thalmichthys molitrix*) in India, Bangladesh and China; eel (*Anguilla anguillia*) in Taiwan Province of China; tilapia (*Oreochromis niloticus*) in Indonesia, East Africa, Java and Taiwan Province of China; and sea bream (*Aparus auratus*) in Turkey and Israel. Second, crustaceans, which are mainly aquatic arthopods, typically possessing a corpus hardened with lime. This includes aquatic organisms such as lobsters, crabs and shrimps (prawns). Cultivation on a commercial scale for domestic consumption and for export is most common for shrimps. The common species are tiger shrimps (*Penaeus mondon*) in China, Indonesia, India, Thailand, the Philippines, Sri Lanka, Bangladesh and Taiwan Province of China; king shrimp (*Penaeus japonicus*) in India, Bangladesh and Taiwan Province of China; and giant

fresh-water prawns (*Macrobrachium rosenbergi*) in India, Bangladesh, Taiwan Province of China, Thailand and the Middle East countries. Third, molluscs are aquatic organisms without backbones and with a soft unsegmented body, quite often with a shell secreted by a fold of skin. This group includes snails (oysters), clams, squid, octopus and Pacific oyster (*Crassostrea gigas*) reared in the Republic of Korea and Taiwan Province of China. Fourth, seaweeds (algae), which are macrophytic aquatic plants. 63/

249. Certain species of aquatic organisms, particularly of fish and prawns, are considered as delicacies and a number of developing countries have created facilities for importing ova or larvae or organisms at the post-larval stages of growth for rearing and export when fully grown.

250. The species reared will depend upon whether the farm is inland, brackish or offshore. These factors have a bearing on the design of insurance schemes. In India there are distinct insurance policies for fresh-water fish and brackish water prawns. In Bangladesh, there is a specific insurance policy for prawn culture. In Chile a policy with variations in coverage according to the type of farm and risks exposed has been introduced. Further, on the basis of the number of species reared, aquaculture units can be classified as monoculture units (rearing of a single species), or polyculture units (rearing of two or more non-competitive species).

2. Age

251. The different stages of the life cycle of aquatic organisms vary according to the species. However, the life cycle can generally be described as follows: the ovum on hatching produces larvae which on metamorphosis take on the characteristics of the parent organism. The various post-larval stages are termed alevin (recently hatched fish), fry (newly hatched fish of approximately 8 mm to 25 mm in size that have the external characteristics of the adult), or parr (synonym for the juvenile stage of fish, particularly salmon). These grow into fingerlings (fish larger than fry but not of a marketable size) or smolt (young fish, in the case of salmon of approximately 20 cm in length). Though not rigidly defined, fingerlings are generally between 2 and 25 cm in length.

252. From the point of view of the insurance model there are three distinct stages in aquatic cultivation. First, the nursery stage, in which post-larvae seedlings, alevin or fry are released in shallow water to grow to the fingerling or smolt stage. The duration of the nursery stage depends on the type of species cultured. In India insurance for the nursery stage of rearing is available for a period of three months in the case of fresh-water fish since farms specializing in cultivation of the nursery stage of fish are in vogue. However, separate farms for cultivation of this stage have not been established for prawns. This is also the case in Bangladesh. In Chile, too, the nursery stage is not covered separately, and the cover starting from the ova stage extends to harvesting. Second, the rearing stage, in which the smolt or fingerlings are transferred for rearing (described as stocking) into bigger and deeper water enclosures to develop into full-grown aquatic organisms of marketable size. This takes 4 to 10 months in the case of prawns and 12 to 15 months in the case of fish. Insurance cover is available on an annual basis from post-larvae to harvesting stage for aquaculture farms

in Chile and Bangladesh. In India, as the optimum period required to attain the marketable size for fresh-water fish is 12 months and for brackish water prawns 4.5 months, insurance is available for a maximum period of 12 months for fresh-water fish and 4.5 months for brackish water prawns. The period can be extended by 15 days for prawns on request. The 12-month and 4.5-month periods have been termed 24 and 9 fortnights respectively, and tables indicating the progressive weights of fish or prawns from the first fortnight to the last fortnight are agreed at the beginning. If a farmer seeks insurance at an intermediate stage, it is offered only for the remaining fortnights. Third, the breeding stage in which sexually mature fish are reared for breeding purposes in hatchery farms. Their cycle continues for several years beyond the marketable fish stage. In India breeding fish (fresh-water) can be insured up to the age of five years. Annual policies for each year are issued.

3. Perils covered

253. In India the insurance covers only total loss of fish or prawns. In Bangladesh and Chile a loss beyond natural mortality (which is agreed as a percentage) is covered.

254. Aquaculture farms are usually in the open, and near the shore. Consequently, they are critically exposed to the vagaries of nature such as flood, storm, cyclone, typhoon, high waves (tidal), drift ice (in cold climates) and earthquake, etc. Careful selection of the location of the project is therefore of vital importance. In Bangladesh the perils covered are flood, flash flood, cyclone and tidal waves. In Chile the extent of coverage and the perils covered vary and are decided after careful consideration of the site and factors such as protective systems and warning devices. All the above-mentioned natural perils can be covered. In India the perils of flood, inundation, storm, cyclone, typhoon, and earthquake are part of the basic cover in brackish water prawn insurance. Since fresh-water fish insurance relates to inland ponds, these perils do not form part of the basic cover, but can be insured on payment of an additional premium.

255. Contraction of a disease by fish is the prime cause of mortality giving rise to a claim, and is the basic peril covered in aquaculture insurance. From the insurance point of view diseases can be broadly grouped into two main categories. First, infectious diseases, whereby a causal agent such as a virus, bacteria, fungus or parasite is able to overpower the immune system under conditions of stress. Second, non-infectious diseases, such as metabolic or deficiency diseases. Infectious diseases are the real concern of insurance since enforcement of better management techniques can reduce the chances of infection. Non-infectious diseases are gradual in development and slow in manifestation and in general can be more easily controlled by the introduction of corrective measures. Mortality due to accident is also covered.

256. In Chile all diseases caused by an identifiable pathogen which produces characteristic symptoms of the disease are covered, while in Bangladesh diseases are not part of the basic cover but parasitic infestations and plague (fatal infections) can be covered on specific request.

257. Losses due to diseases occurring within 15 days from the inception of the policy have been excluded in India. All diseases are covered except worm infestations such as trematodes (particularly monogenetic and digenetic), cestodes, nematodes and fish leeches in the case of fresh water fish, and soft shell disease (due to genetic or management factors) in the case of brackish water prawn.

258. In Chile mortality due to a disease where a causative organism has been seen but could not be identified even after a veterinary examination is excluded. This provision has been made to exclude the risk of new diseases for which lines of treatment are not established. Another noteworthy feature in Chile is coverage of mortality or loss occurring within 30 days of the expiry of the policy, if caused by a disease that had already manifested itself during the period of insurance. This is based on the principle of proximate cause.

259. Aquaculture farms are typically exposed to the risk of pollution which may be organic or inorganic in nature, and continuous or accidental in origin. Pollution acts as a deterrent to the ecosystem in which fish grow and, hence, is important from the insurance point of view. Risk of pollution is covered in Chile and India. However, its scope has been restricted in India by an exclusion according to which losses due to change in the chemical status of soil or water, the pH factor of which and asphyxia are not covered. Losses due to attack by predators and burglary can be covered in Chile, but are excluded in India.

260. Risks of unforeseen human behaviour such as riot and strike and malicious damage are covered in India, but excluded in Bangladesh and Chile. Risk of infidelity of staff, theft and mysterious disappearance are specifically excluded in India and Bangladesh, but the risk of infidelity of staff can be covered in Chile.

261. Damage due to aircraft and other aerial devices and articles dropped therefrom, along with impact damage by road vehicles are also covered in India and Chile. These risks are not covered in Bangladesh and Chile. Similarly, summer kill due to a rise in water temperature to over 40° C is covered in India and Chile. Policies in all three countries are subject to general exclusions pertaining to radioactive radiation, war perils, wilful negligence by the insured or his representatives, any type of consequential loss, and intentional slaughter whether by order of a public authority or not. Furthermore, losses due to management factors, including failure to maintain the temperature, overcrowding, water salinity, inadequate water flow (which affects the oxygen level), sampling of fish and improper handling of the stock are also excluded in India and Chile. In view of the importance of the equipment used in a modern aquaculture farm, losses arising out of wear and tear and poor maintenance of equipment have been specifically excluded in Chile. Another noteworthy feature of the policy in Chile is the definition of the duration of an occurrence for various perils covered. For storm, flood, typhoon and cyclone it is two weeks; for diseases it is two months; for algae bloom and predators' attack despite the required precaution it is one month; and for technical breakdown in land-based systems, predators' attack for which precautions could not be taken, and other perils, it is one

week. Ongoing losses occurring due to a peril within the defined duration are considered as one loss.

4. Sum insured

262. In this section the practices followed in respect of fixation of the sum insured and the related issue of the basis of indemnity are discussed. The value of an aquatic organism changes as it grows. Thus, there cannot be a fixed value at risk at all times during the period of insurance. However, for purposes of practical application, a table of progressive values for different periods of growth has been worked out on the basis of an agreed density of stock. It is also related to the expected growth of weight per fish, prawn or oyster, after allowance is made for the natural mortality percentage. The table is revised periodically to reflect current prices, taking into account the cost of seedlings, expenses connected with preparation of the tank or pond or the enclosure, cost of feed, organic and inorganic fertilizer, medicine, watch and ward, rent of the tank or pond, equipment used on the farm, management expenses, including those incurred to maintain a proper water level, and other agreed incidental and miscellaneous expenses. The profit element is not included. Sometimes these values are shown as a percentage of the highest value of the culture at the time of harvest. The tables are prepared on a fortnightly basis in India. In Chile they are prepared on a monthly basis, and are projected in the rearing plan, along with the projected average sum insured. However, the actual sum insured is declared by the insured every month. Indemnification is based on the value at the time of loss as shown in the last monthly declaration. The deductible is based on the value at the time of loss per location. In Bangladesh the value of larvae at the nursery stage and also at the rearing stage is fixed at TK 0.20 to 0.30 per larva in nursery embankment, and TK 0.50 to 0.60 per larva in production embankment. In India the premium is calculated in the case of fresh-water fish on the basis of the average value of the fish, arrived at by dividing by two the value at entry and at the harvest time. However, in the case of brackish water prawn insurance, the premium is calculated on the harvest value of the culture. In Chile it is charged on the average sum insured. In Bangladesh it is based on the agreed value of the stock.

263. In India the indemnity payable is 80 per cent of the input costs as per the valuation table, which is utilized both for calculating the premium and determining the indemnity payable. The salvage value of the remaining fish or prawns is deducted from the value as per the valuation table. However, if the entire population is lost, or in the event of poisoning or pollution, or when the fish is unfit for human consumption, no salvage is deducted. In Bangladesh indemnity payable is as per the agreed value table, subject to an excess of 20 per cent. In Chile a similar system is followed but the excess is variable, being 20 per cent in the case of diseases and algae bloom, and 15 per cent for other perils.

5. Premium rate

264. In India the rate is 4 per cent for fresh-water fish insurance. For the optional cover of flood, storm, etc., an additional premium of 2 per cent is charged. A lower premium of 3 per cent for the basic cover and 1.7 per cent

for additional perils is charged on "scheme" enterprises. A rate of 4 per cent is applied for the insurance of brackish water prawn. There is no provision for a short period policy. Insurance is for one cycle, and cannot be extended. All the tanks and ponds, in fact the entire water area utilized, has to be insured. Partial insurance is not allowed. In Bangladesh the rate is 2.5 per cent. In Chile the premium rate ranges from 4 to 6.5 per cent according to the nature of the risk. There is a provision for reinstatement on a *pro rata* basis. This facility is not available in India and Bangladesh. Further, in Chile a provisional and deposit premium is charged taking into account the sum insured, and adjusted at the end of the policy period by calculating the final premium on the basis of the actual sum insured.

6. Farm management practices and administration

265. Aquaculture is a risky proposition and requires appropriate technology, coupled with skilled and experienced farm management. Location of the farm is an important factor as it has a direct bearing on environmental control, particularly for offshore projects. To ascertain the insurability of aquaculture projects, inspection of the farm by a company representative is therefore of paramount importance. This is done in all the countries. The proposal form and the information given by the proposer are critically examined and verified. Since the performance of the aquaculture stock is closely related to the quality of management, strict conditions are stipulated. These are summarized below. However, the position is not indicated countrywise since many of the conditions are common; when there is a significant difference the country is mentioned. The proposal form contains questions relating to the proposer, the species cultured, production details, disease and other loss control measures, anticipated risks and loss experience, if any. The proposal form in Bangladesh is exhaustive, with questions on the water supply, flow and quality of water. A site plan showing the location of the farm has to be provided. In Chile a detailed rearing plan is required to be submitted. A certificate of good health is required before each renewal. This provision has been made to exclude an inflation in the so-called syndromes, for example, blue-berry and coho syndromes. In India full particulars of epidemics, diseases, parasitical attack, injury, illness or physical defects encountered in the earlier batches have to be disclosed before each renewal of insurance or introduction of a fresh batch, irrespective of whether a claim was made or not. Any change in management and key personnel is considered as a material change, and the company must be immediately informed. A condition to this effect has specifically been mentioned in Chile and Bangladesh. In India, it is stipulated that reasonable care and diligence has to be exercised in selection of employees and change in insurable interest is not allowed. To avoid the possibility of anti-selection, partial insurance is not allowed. The entire water area in the project must be insured.

266. Conditions relating to health and due care of the stock are present in all aquaculture policies. Important conditions are as follows: first, the stock proposed for insurance must be in sound health and free from any disease, disability or injury. In India a health certificate from a qualified officer of the Fisheries Department is required at the time of acceptance of the risk. Second, proper care of the stock has to be provided

at all times. Third, on discovery of any infection, the diseased stock has to be completely separated from the others and the necessary precautions taken to protect the latter's health. The company must be informed of the steps taken. Fourth, the dead stock, if any, must be promptly removed.

267. In India the following conditions have been stipulated in respect of maintenance of the farm: effective liming, manuring, deweeding, desilting, earth excavation and earth improvement at appropriate times, and maintenance of records to that effect, strong and sufficient embankment of 8 feet in height from ground level in non-flood areas and 12 to 15 feet in flood-prone areas, proper regulation of water movement by suitable inlets, outlets and sluices, regular water analysis, follow-up of a proper work schedule, screening and closing of possible escape routes such as gaps in embankments, maintenance of a proper water level at all times, maintenance of soil and water in a condition capable of giving the expected productivity, purchase of fish seed from standard reputable suppliers, and the presence of a 24-hour watchman at the site or the adoption of alternative suitable measures to protect the pond or tank from outsiders. In Chile a condition requires proper maintenance and testing of protective systems and warning devices. Furthermore, proper installation of the equipment necessary for the production system is essential for acceptance of risk. Breakdown of equipment can be covered as an additional risk.

268. As a part of monitoring the operations, and also to facilitate assessment of loss if it takes place, it is stipulated in India that records of the stock must be maintained on a daily basis, including mortality, feed given, incidence of diseases encountered and preventive measures taken, inputs given and expenditure incurred. In Chile feed and stock records have to be maintained. It is obligatory on the part of the insured to submit monthly stock declarations. In Bangladesh, too, stock records are to be kept.

269. A close link is usually maintained with the Fisheries Department. In fact, the various input costs (required to work out valuation tables), conditions to be stipulated, underwriting precautions to be taken, etc., are established on the basis of information obtained through this source. In countries where legislation exists in respect of epidemic and or zoonotic diseases of various animals, it is in the interest of the company to maintain a close liaison with the respective government department and collect details of the affected farms, along with the measures taken to arrest the spread. Further, in the case of farms which rely on imports of live fish, insurance is granted only after verification that the applicable quarantine measures have been complied with.

7. Assessment of loss

270. Immediate action is necessary whenever an event that is likely to give rise to a claim takes place. The insured is required to inform the company within a specified time-limit. This is 12 hours in India and 72 hours in Chile. In Bangladesh a time-limit has not been specified, but it is obligatory on the part of the insured to inform the company immediately by telex, telegram or telephone. In India instructions given by the representative of the company who visits the farm for inspection must be

complied with. In Bangladesh the company has the right to call a specialist for advice and samples can be collected. The cost of taking the samples has to be borne by the company. In Chile the insured is obliged to accept the loss minimization measures suggested by the company. The company bears 25 per cent of the expenses incurred. This also applies to predictable losses due to insured peril, such as algae bloom or drift ice. In India the insured is required to submit claim papers within 14 days. A death certificate, a laboratory certificate in cases of disease and a water analysis report also have to be provided. A meteorological report is required in cases of loss due to vagaries of nature such as flood, cyclone, etc. Receipts and bills of expenditure have to be submitted. All dead fish have to be produced before the representative of the company. In Chile a preliminary loss report has to be submitted within seven days, along with documentary evidence as required by the company. It often happens that the fish die due to an act of a third party. The insured is specifically prohibited from entering into a compromise arrangement, and the company has the right to take all legal proceedings.

C. Insurance of tanks, ponds and equipment

271. Insurance is provided in India for tanks and ponds for rearing fish against fire, lightning, riot, storm, tempest, flood, malicious damage, explosion, earthquake and aircraft damage, subject to specific exclusions for erosion due to the normal wave action of water, natural erosion and consolidation of embankments. This is a property risk and, unless insured for full value, the "average" clause applies. The embankment must be 8 feet in height from the surrounding area in non-flood areas and 12 feet in flood-prone areas. The height above the water level (inside) should be at least 3 feet. The width of the embankment must be 6 to 8 feet depending upon the intensity of rain in the area. The premium is 0.5 per cent in non-flood areas and one per cent in flood-prone areas in the case of fresh-water fish. For brackish water prawn it is one per cent without any differential rate for the area. In Bangladesh, embankments, buildings and other structures are covered against the perils of flood, cyclone, flash flood and tidal waves. The premium rate is 2.5 per cent.

272. In modern aquaculture farms various types of equipment are used, such as pumps, water control systems, aerators, cages, feeding equipment, grading and transport systems, alarm and other warning devices, cranes, nets, equipment related to various protection systems, laboratory equipment such as thermometers, pH and salinity meters, microscopes, ovens, centrifugal machines, etc. Some of the equipment used on the farms can be electrically operated while others can be manual or fuel driven. Insurance of the equipment is similar to that of machinery and other properties, for which risks of fire and allied perils, breakdown (mechanical or electrical), and burglary are covered. In cases where the damage can be repaired, indemnification is provided for repair and restoration of the equipment to its earlier condition. In the case of total loss, indemnity is to the extent of actual value of the item before the occurrence of the loss. The actual value is arrived at by applying a reasonable depreciation to the replacement cost of the item.

D. Insurance relating to catching (capturing) of fish

273. As already noted, it is difficult to provide insurance for fish in seas, lakes, ponds and rivers that are accessible to everyone. However, a large number of persons in developing countries are engaged in fishing. They capture fish from rivers, lakes and the sea coast. In many cases they can be compared with the semi-commercial and emerging sector of farmers and some of them may have reached the stage of commercial operations. In this case, insurance services would include cover for their fishing boats, trawlers (sometimes mechanized), the fishing nets and other fishing-related equipment. The cover is usually provided by the marine hull department of insurance companies, and therefore the design is not discussed here. It may, however, be mentioned that in underwriting these risks two main issues are faced. The first is the weather in which fishing is done. Fishermen are courageous and often daring and continue to operate in unfavourable conditions. Consequently a warranty is often imposed for termination of insurance at the onset of specified weather conditions, for example the beginning of the rainy season. Maintaining close contact with port and coastal weather units is essential. The second issue relates to improper maintenance of property. In developing countries the vessels utilized for fishing are not necessarily classed with a classification society. It often happens therefore that when the vessel or the equipment becomes unserviceable, it is scuttled and the insurance amount claimed. With suitable underwriting restrictions and imposition of warranties for periodic repair and overhaul, inspection, etc., it is possible to control such practices.

274. Transportation of fish after being captured from open areas or harvested in aquaculture farms requires insurance. This is a marine cargo risk and is underwritten by the department dealing with it. Refrigerated transport is not available in many developing countries. High levels of franchise and deductibles would have to be provided.

275. Fishermen are frequently exposed to adverse weather conditions in pursuing their occupation and, although they build up a degree of immunity, are none the less prone to accidents and sickness. Life insurance, or at least accident insurance, needs to be provided to them. Even if medical insurance is difficult to provide to such an unorganized group, at least hospitalization insurance should be attempted. Fishermen are usually members of a cooperative or a union, and insurance can be negotiated through these bodies.

E. General observations

1. General

276. In the aquaculture schemes cited, the loss ratio has been as follows: Bangladesh, not available; Chile, 270 per cent in 1988, 170 per cent in 1989, 105 per cent in 1990, and 80 per cent in 1991; India, 76.5 per cent for fresh-water fish during 1984-1989 (loss ratio for prawn insurance in brackish water is not available since insurance started only recently). Of the six countries that reported offering aquaculture insurance in response to the UNCTAD questionnaire, four countries described it as self-supporting, one country stated that the premium is subsidized by the State, and the remaining

country did not respond to the specific question about viability of the scheme. Furthermore, five out of the six countries stated that it is possible to keep moral hazard within normal limits.

277. The potential for growth of business is substantial. According to an estimate only about 15 per cent of the world's total fish production is at present realized through the aquaculture sector, and since fish capturing activities are nearing their production ceilings, the bulk of the future increase is expected to be through aquaculture units. Aquaculture already accounts for 80 per cent of total production of molluscs, and 75 per cent of seaweed, but its share in total production of fin fish is lower at 7 per cent and crustaceans at 4 per cent. Production of these species has been increasing in recent years and is likely to rise substantially in the future. It is anticipated that aquaculture production will double in the next 12 years, representing about 30 per cent of the total fish production. 64/ Since management norms stipulated by insurance companies will have to be observed by the enterprises concerned, a contribution will have been made towards improving the standards of this activity in the country.

278. At the same time, the problems likely to be encountered should not be underestimated since water is a difficult medium with which to operate. Fish cannot live without water, but the need for a continuous supply of it imposes significant engineering disciplines on the farmer. Marine environment generates its own special exposures of wind, wave and tide, and hazards such as plankton bloom. It has also been found that diseases follow on from simple events - storms, floods, electrical breakdowns, plankton blooms, for example, tend to have knock-on effects. Comparatively insignificant situations can deteriorate very quickly into serious disease losses. Often two different causes are involved; for example, concurrent disease and lice infestations have been a feature of salmon farming on many occasions. 65/

279. Aquaculture is a new area for insurance industry in developing countries, and in view of the difficulties involved a cautious and step-by-step approach is advisable. The first requirement is to base underwriting on strict technical considerations. The second critical condition is the establishment of a system of inspection whenever any abnormality has been noticed in the fish stock. Quick action is of paramount importance to reduce the extent of loss.

280. To a casual observer it would appear that counting fish is almost an impossibility. However, techniques of determining the number of fish through samples of density are well developed and known to those in the trade, and are not difficult for an engineer or veterinarian to master. Admittedly, however, it is a new line of business both for the insurance industry and the entrepreneur, and both sides have to learn from experience.

2. Underwriting aspects

281. Management practices have a strong influence on the results of aquaculture farming. There could be a tendency to boost the returns of the enterprises by increasing stock density. This adversely affects the health of the stock and is obviously not in the interests of the insurer.